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ANNALES

de la  
SOCIÉTÉ SUISSE DE ZOOLOGIE  
et du  
MUSÉUM D'HISTOIRE NATURELLE  
de la Ville de Genève

tome 110  
fascicule 1  
2003

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REVUE SUISSE DE ZOOLOGIE

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## TOME 110—FASCICULE 1

Publication subventionnée par:  
ACADÉMIE SUISSE DES SCIENCES NATURELLES ASSN  
VILLE DE GENÈVE  
SOCIÉTÉ SUISSE DE ZOOLOGIE

VOLKER MAHNERT  
Directeur du Muséum d'histoire naturelle de Genève

CHARLES LIENHARD  
Chargé de recherche au Muséum d'histoire naturelle de Genève

### *Comité de lecture*

Il est constitué en outre du président de la Société suisse de Zoologie, du directeur du Muséum de Genève et de représentants des instituts de zoologie des universités suisses.

Les manuscrits sont soumis à des experts d'institutions suisses ou étrangères selon le sujet étudié.

La préférence sera donnée aux travaux concernant les domaines suivants: biogéographie, systématique, évolution, écologie, éthologie, morphologie et anatomie comparée, physiologie.

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## Catalogue of type-material of stick-insects housed in the Muséum d'histoire naturelle, Geneva, with descriptions of some new taxa (Insecta: Phasmatodea)

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**Catalogue of type-material of stick-insects housed in the Muséum d'histoire naturelle, Geneva, with descriptions of some new taxa (Insecta: Phasmatodea).** - Type specimens for 157 species-group names of Phasmida have been identified in the collection of the Muséum d'histoire naturelle, Geneva. The names are listed alphabetically, with the number of specimens, sex and locality data. The material includes most species described by Saussure and the majority of those described by Carl; in addition there is material of Bolívar, Brock, Brunner von Wattenwyl, Fritzsche & Gitsaga, Günther, Harz, Kirby, Redtenbacher, Werner and Zompro. *Clitumnus humberti* Carl, 1913 is re-named *Ramulus carli* Zompro nom. n. Lectotypes are designated for *Xera debilis* Redtenbacher, 1906, *Clonistria guatemalensis* Redtenbacher, 1908, *Ramulus humberti* (Saussure, 1861) and *Anophelepis poeyi* Saussure, 1868. One genus and four species are described as new. *Parapodacanthus* Brock gen. n., with the type-species *P. hasenpuschorum* Brock sp. n., is described from Queensland, Australia. Three Philippine species are provisionally placed in the genus *Lonchodes* Gray, 1835: *L. putingmantsa* Zompro sp. n., *L. magayon* Zompro sp. n. and *L. dalawangsungay* Zompro sp. n.; this complex urgently needs a generic revision. The eggs of *Alienobostra godmani* (Redtenbacher, 1908) and *Lonchodes palawanicus* (Carl, 1913) are described and figured for the first time. *Xylodus* Saussure, 1859, formerly synonymized with *Cladomorphus* Gray, 1835, and *Micrarchus* Carl, 1913 formerly synonymized with *Pachymorpha* Gray, 1835, are re-established as valid genera. *Bacteria divergens* Redtenbacher, 1908 is found to be a new synonym of *Phanocloidea muricata* (Burmeister, 1838), and *Ocnophila adulterina* Brunner v. Wattenwyl, 1907 of *Lamponius guerini* (Saussure, 1868). *Prisomera palawanica* Carl, 1915 is transferred to *Stheneboea* Stål, 1875, and *Myronides trilineatus* Carl, 1913 to *Lopaphus* Westwood, 1859.

**Key-words:** Phasmatodea - type material - Geneva Museum of Natural History - new genus - new species - eggs - catalogue.

## INTRODUCTION

The Phasmatodea collection in the Muséum d'histoire naturelle, Geneva, Switzerland (MHNG) contains type specimens for 157 species-group names. The collection is very important for the taxonomist, as it includes most of Saussure's type material (mid 1800's), which was published after Westwood's major catalogue of the order (1859). The vast majority of Carl's (1913, 1915) type specimens are also present, the remainder is in Naturhistorisches Museum, Basel, Switzerland (NHMB). Brunner von Wattenwyl and Redtenbacher (1906-08) had already selected a number of specimens in MHNG as type material. In addition, there are single species described by Bolívar (1888), Günther (1937), Kirby (1904) and Werner (1918) and an invalid neotype designation by Harz (1976). Recently Brock, Fritzsche & Gitsaga and Zompro have added material. The collection is considered to be one of the most important for the taxonomist (Brock, 1999).

The phasmid collection is housed in 93 cabinet drawers with dimensions of 46 x 36 x 6cm, with type material included in the general collection. Additionally, there are three drawers in the separate collection of Harz, which contain phasmids. Although mainly containing specimens named and labelled by curators, the collection includes some unidentified specimens, such as phasmids from the Philippines, only identified by K. Günther to genus level, housed in drawers labelled "Dépôt". There are also a few phasmid specimens in alcohol. Although little research has been made on the collection since Carl's papers (1913, 1915), it has been examined by the following, who have added various labels to specimens: P. D. Brock, M. Hebard, C. F. Moxey and O. Zompro. Moxey placed various 'lectotype' labels on specimens; however, these are not valid, as his 1972 thesis on phasmids from the West Indies was not published. Hennemann also placed various notes, including lectotype labels. These are also not valid before a publication. As both data are invalid at the present state, they are omitted from this catalogue.

## LIST OF TYPE-SPECIMENS

The following is a complete list of type material of Phasmatodea known to be in the MHNG (up to March 2001), according to detailed, independent checks of specimens and literature by both authors.

The systematics of this order are overworked by Zompro recently; therefore a systematic arrangement is pointless and names are arranged alphabetically by species as originally published. The cabinet drawer number is given in square brackets. Data are as recorded on data labels. If they do not agree with the data in the original publication, comments are provided. Several species have not been found in the cabinet drawers, nor by reference to the museum's card index to species, despite detailed searches. Reference is made where specimens have been traced in other collections. The actual combination of each species is mentioned, if possible corresponding to the present state of research.

Museum-codes are as follows:

ANIC Australian National Insect Collection, CSIRO, Canberra, Australia.

ANSP Academy of Natural Sciences, Philadelphia, USA.

- BMNH The Natural History Museum, London, England.  
 CUMZ University Museum of Zoology Insect Collection, Cambridge, England.  
 DEIC Deutsches Entomologisches Institut, Eberswalde, Germany.  
 ETHZ Eidgenössische Technische Hochschule, Zurich, Switzerland.  
 HNHM Hungarian Natural History Museum, Budapest, Hungary.  
 ISNB Institut Royal des Sciences Naturelles, Brussels, Belgium.  
 MCSN Museo Civico di Storia Naturale „Giacomo Doria“, Genoa, Italy.  
 MHNG Muséum d'histoire naturelle, Geneva, Switzerland.  
 MNHN Muséum National d'Histoire Naturelle, Paris, France.  
 MNMS Museo Nacional de Ciencias Naturales, Madrid, Spain.  
 NHMB Naturhistorisches Museum, Basel, Switzerland.  
 NHMW Naturhistorisches Museum, Vienna, Austria.  
 SMFD Forschungsinstitut und Naturmuseum Senckenberg, Frankfurt am Main, Germany.  
 SMNS Staatliches Museum für Naturkunde, Stuttgart, Germany.  
 SMTD Staatliches Museum für Tierkunde, Dresden, Germany.  
 QMBA Queensland Museum, South Brisbane, Queensland, Australia.  
 UMBB Übersee-Museum, Bremen, Germany.  
 ZMAS Zoological Museum, Academy of Science, St. Petersburg, Russia.  
 ZMHB Zoologisches Museum der Humboldt-Universität, Berlin, Germany.  
 ZMUH Zoologisches Museum der Universität Hamburg, Germany.  
 ZMUK Zoologisches Museum der Christian-Albrechts-Universität, Kiel, Germany.  
 ZSMC Zoologische Staatssammlung, München, Germany.

Other abbreviations used:

HT / AT / PT / ST / LT / PLT: Holo- / Allo- / Para- / Syn- / Lecto- / Paralectotype.

Type-information is listed in the following format:

**species-group name** author, year of publication: page [*original genus*]

[Number and sexes of types and localities as recorded in original description]

Museum [Drawer-number]: Number of specimens.

List of types including inscriptions of labels. Different labels are separated by ( ; ).

[Valid name]

(Name in collection)

Comment.

**adulterina** Brunner v. Wattenwyl, 1907: 316 [*Ocnophila*]

[♂. Guadeloupe (Mus. Genav.).]

MHNG [41]: 1 ♂.

HT ♂: Guadeloupe, M. Schramm.

[*Lamponius guerini* (Saussure, 1868) **syn. n.**]

(In collection as *Ocnophila adulterina* Brunner v. Wattenwyl.)

**adumbratus** Saussure, 1859: 62 [*Xylodus*]

[♀. Portorico.]

MHNG [64]: 1 ♀.

HT: ♀, Porto Rico, Bresil, M. T. J. Gidet, 189/53

Fig. 1

[*Xylodus adumbratus* Saussure, 1859]

(In collection as *Phibalosoma ceratocephalum* Gray.)

Comment. *Xylodus* Saussure, 1859, with the type-species *Xylodus adumbratus* Saussure, 1859, has been synonymized in error with *Phibalosoma* Gray, 1835, by Redtenbacher (1908: 425). *Phibalosoma* is a synonym of *Cladomorphus* Gray, 1835, synonymized by Kirby (1904: 356). The genitalia of *Xylodus* differ strikingly from those of *Cladomorphus*, therefore *Xylodus* is re-established as a valid genus. Further research is in progress by Zompro.

**aestuans** Saussure, 1861a: 474, pl. 11: 2 [*Bacteria (Bacunculus)*]

[♀. Du vieux Calabar.]

MHNG [?]: Not traced.

**annulata** Carl, 1913: 32 [*Dyme*]

[1 ♂. Guyana. Muséum de Genève.]

MHNG [44]: 1 ♂.

HT ♂: Guyana, Saussure.

[*Globocalynda annulata* (Carl, 1913)]

(In collection as *Dyme annulata* Carl.)

**antillarum** Saussure, 1868: 65 [*Bacteria*]

[Insula Gadalupe.]

MHNG [42, 43]: 3 ♂, 4 ♀, 1 egg ex ovipositor.

ST: 1 ♂, 1 ♀, 1 egg ex ovipositor: Guadeloupe, Schramm; 2 ♂, 2 ♀:

Guadeloupe, H. d. Saussure; ♀: Guadeloupe, coll. Guerin.

Further material in ETHZ.

[*Bacteria ferula* (Fabricius, 1793)]

(In collection as *Dyme antillarum* Saussure.)

Comment. *Bacteria ferula* (Fabricius, 1793), was synonymized with *Bacteria crudelis* Westwood, 1859, by Kirby, 1904c: 346, and the latter was synonymized with *Bacteria ferula* (Fabricius, 1793) by Brock, 1998: 33.

**atropurpurea** Carl, 1913: 33 [*Dyme*]

[1 ♀. Espirito-Santo, Brasilia. Muséum de Genève.]

MHNG [42]: 1 ♂.

HT ♂: Espirito Santo, Brasil, ex coll. Fruhstorfer. [Recorded by Carl as ♀]

[*Dyme atropurpurea* Carl, 1913]

**augusta** Carl, 1913: 17 [*Cuniculina*]

[1 ♀. Than-Moi, Tonkin. Muséum de Genève.]

MHNG [28]: 1 ♀.

HT ♀: Tonkin, Than-Moi, Jan.-Juli, Fruhstorfer.

[*Ramulus augusta* (Carl, 1913)]

**azteca** Saussure, 1859: 62 [*Bacteria*]

[♀. *Littus mexicanum*.]

MHNG [?]: Not traced.

[*Pseudosermyle azteca* (Saussure, 1859)]

**baculus** Saussure, 1859: 62 [*Bacteria*]

[♀. America.]

MHNG [45]: 1 ♀.

HT ♀: Amer. mer, 475/20.

(In collection as *Bacunculus baculus* Saussure.)

**bedoti** Redtenbacher, 1908: 388, pl. 19: 1 [*Rhaphiderus*]

[♂. Tonking (Mus. Genf, Coll. m.)]

MHNG [54]: 1 ♂.

ST: 1 ♂, Tonkin.

Further type-material in NHMW.

[*Rhaphiderus bedoti* Redtenbacher, 1908]

**biceps** Redtenbacher, 1908: 451 [*Pharnacia*]

[♂ ♀. Assam (Mus. Stuttgart); Tonking (Mus. Paris); Java (Mus. Genf, Mus. Budapest, Mus. Berlin, Coll. m., Mus. Ak. Petersburg, Mus. Brüssel, Mus. Paris, Mus. Hamburg, Hofmus. Wien)]

MHNG [69]: 2 ♂, 2 ♀.

ST: 2 ♂, Java, Or., Passeroean 622/20; 2 ♀, Java.

Further type-material present in ISNB, NHMW, SMNS, ZMAS, ZMHB, ZMUH.

[*Pharnacia biceps* Redtenbacher, 1908]

**bicolor** Carl, 1913: 14 [*Clitumnus*]

[2 ♂. Than-Moi, Tonkin.]

MHNG [25]: 2 ♂.

ST: 2 ♂: Tonkin, Than-Moi, Jan.-Juli, Fruhstorfer.

[*Ramulus bicolor* (Carl, 1913)]

(In collection as *Clitumnus bicolor* Carl.)

**bicolor** Günther, 1937a: 90, pl. 1: 3 [*Neopromachus*]

[9 ♂♂, Torricelli-Gebirge, 700-900m]

Type-series: 9 ♂♂.

MHNG [40]: 2 ♂.

ST: 1 ♂, Kais. Wilhelmsland, Torricelli Gebirge, Dr. Schlaginhaufen, 780 m, 1910 1; 1 ♂, Kais. Wilhelmsland, Torricelli Gebirge, Dr. Schlaginhaufen, 720 m, 1910 1.

Further type-material in SMTD.

[*Neopromachus pachynotus bicolor* Günther, 1937]

**bifasciatus** Redtenbacher, 1906: 102 [*Eucles*]

[♀. Costa-Rica (Mus. Genf).]

MHNG [10]: 1 ♀.

HT: ♀, Costa Rica, Amer. Centr., Biolley.

Also a non-type ♂ described by Carl (1913: 7) present.

[*Eucles bifasciatus* Redtenbacher, 1906]

**biolleyi** Carl, 1913: 9 [*Prisopus*]

[1 ♂. La Laguna, Carillo, 1000m, Costarica. (P. Biolley leg.).]

MHNG [16]: 1 ♂.

HT ♂: Costa Rica, La Laguna, Chemin de Carillo, 1000 m, Biolley.

[*Prisopus biolleyi* Carl, 1913]

**borneensis** Carl, 1913: 44, pl. 1: 4, 5 [*Echinoclonia*]

[1 ♀. Brunei, Borneo sept. Muséum de Genève.]

Fig. 15

MHNG [76]: 1 ♀.

HT ♀: Borneo, Staudinger.

[*Parastheneboea laetior* (Brunner v. Wattenwyl, 1907), synonymized by Günther, 1933: 260.]

(In collection as *Acanthocleon borneense* Carl.)

Comment. "*Acanthocleon*" is an unpublished name and therefore invalid.

***brevipes*** Redtenbacher, 1908: 441, pl. 21: 4a, b [*Stephanacris*]

[♂ ♀. Neu-Guinea (Mus. Budapest; Coll. m., Coll. Staudinger).]

MHNG [67]: 1 ♂, 1 ♀.

ST (?): 1 ♂, 1 ♀, N. Guinea, Biro 1899, Sattelberg, Huon Golf.

Possibly syntypes from the Staudinger-collection, the status is unclear. The data are the same as for part of the type-material in NHMW and may have originated from HHM. Brunner and Redtenbacher did not label all material, sometimes labels have been taken off or replaced subsequently. Material also present in ZMUH.

[*Stephanacris brevipes* Redtenbacher, 1908]

***brevitarsus*** Carl, 1913: 38, pl. 1: 6 [*Antillophilus*]

[1 ♀. Guadeloupe. Muséum de Genève.]

MHNG [49]: 1 ♀.

HT ♀: Guadeloupe, Saussure.

[*Lamponius guerini* (Saussure, 1868), synonymized by Langlois & Lelong, 1997: 49.]

***burkartii*** Saussure, 1868: 65 [*Bacteria*]

[Mexico.]

MHNG [?]: Not traced.

[*Phanocles burkartii* (Saussure, 1868)]

***capitata*** Brunner v. Wattenwyl, 1907: 315 [*Ocnophila*]

[♂. Peru (Mus. Genav.).]

MHNG [41]: 5 ♂.

ST: 5 ♂, Lima, Perou, Anc. coll.

Also undescribed ♀ are present, with same data, not treated in original publication.

[*Ocnophila capitata* Brunner v. Wattenwyl, 1907]

***carinulatus*** Saussure, 1868: 63 [*Bacillus*]

Figs 2-4

[Ceylon ?]

MHNG [30]: 2 ♀, 2 ♀ nymphs.

ST: 2 ♀, 2 ♀ nymphs, Malabar.

[*Gratidia carinulata* (Saussure, 1868)]

***ceylonica*** Saussure, 1868: 67 [*Anophelepis*]

Fig. 5

[Ceylon.]

MHNG [76]: 1 ♀.

HT: ♀, Ceylon, M. H. de Saussure.

[*Paramenexenus ceylonicus* (Saussure, 1868)]

***ceylonica*** Saussure, 1868: 69 [*Necroscia*]

[Ceylon.]

MHNG [90]: 8 ♂, 1 ♀.

ST: 8 ♂, 1 ♀, Ceylon, Mr. Brunner d. W., 609/56.

[In collection as *Sipyloidea ceylonica* (Saussure)]

[*Necrosia ceylonica* Saussure, 1868]

**ceylonicus** Saussure, 1868: 66 [*Lonchodes*]

[Ceylon.]

MHNG [25]: 2 ♂.

ST: 2 ♂, Ceylon, Nitner.

[*Ramulus ceylonicus* (Saussure, 1868)]

[In collection as *Clitumnus ceylonicus* (Saussure)]

**circe** Redtenbacher, 1908: 347 [*Canachus*]

[♂ ♀. Neu-Caledonien (Mus. Genf); Singapore (?) (Hofmus. Wien).]

MHNG [47]: 1 ♀.

ST: 1 ♀, Nov. Caledonie, Ozeanie.

[*Paracanachus circe* (Redtenbacher, 1908)]

Further type-material in NHMW.

**claraziana** Saussure, 1868: 64 [*Anisomorpha*]

[♀. Ager Argentinus (la Plata)]

MHNG [64]: 1 ♂.

HT ♂: Rio Chulat, Rep. Arg., S. Claraza. [Saussure's ♀ (nymph ?) is a ♂]

[*Agathemera claraziana* (Saussure, 1868)]

[In collection as *Agathemera pardalina* (Westwood, 1859)]

**composita** Carl, 1913: 42 [*Achrioptera*]

[1 ♂ „Madagascar“ (?). Muséum de Genève.]

MHNG [66]: 1 ♂.

HT ♂: No label.

[*Achrioptera composita* Carl, 1913]

**continentalis** Carl, 1913: 18 [*Entoria*]

[1 ♀. Tonkin (Than-Moi). Muséum de Genève.]

MHNG [29]: 1 ♀.

HT ♀: Tonkin, Than-Moi, Jan.-Juli, Fruhstorfer.

[*Entoria continentalis* Carl, 1913]

**cornuta** Saussure, 1861b: 128. [*Bacteria*]

[Mexico calida.]

MHNG [90]: Not traced.

**coronata** Carl, 1913: 34 [*Calynda*]

[1 ♀, San José, Costarica (1161m); 1 ♀, San Carlos, Costarica (250m). (P. Biolley leg.). Muséum de Genève.]

MHNG [44]: 2 ♀.

ST: ♀: Costa Rica, San Jose, 1161 m; ♀: San Carlos, 250 m, Biolley.

[*Calynda coronata* Carl, 1913]

**coulonianum** Saussure, 1868: 66 [*Bactridium*]

[Nova Hollendia.- (Specimen e Chile?)]

MHNG [9]: 1 ♀.

HT ♀: Nova Holl.

[*Heteronemia mexicana* Gray, 1835, synonymized by Zompro, 2001b.]

(In collection as *Donusa proluxa* Stål.)

**cubaensis** Saussure, 1869: 159 [*Bacteria*]

[♀. L'île de Cuba.]

MHNG [?]: Not traced.

[*Bacteria cubaensis* Saussure, 1869]

**cubensis** Saussure, 1868: 68 [*Haplopus*]

[♀. Cuba.]

MHNG [64]: 1 ♀.

HT ♀: Cuba.

[*Aplopus cubensis* Saussure, 1868]

**cubensis** Saussure, 1868: 69 [*Phasma*]

Figs 6, 59

[No locality mentioned.]

MHNG [14]: 4 ♂.

ST: 2 ♂: Cuba, H. d. Saussure; 2 ♂: Cuba, acheté à M. Poey.

[*Alloephasma poeyi* (Saussure, 1868), synonymized by Redtenbacher, 1906: 127]

**cubensis** Saussure, 1868: 67 [*Phybalosoma*]

[♂. Cuba.]

MHNG [61]: 1 ♂.

HT ♂: Cuba, H. d. Saussure.

[In collection as *Bacteria cubensis* (Saussure)]

**cultratolobatus** Brunner v. Wattenwyl, 1907: 273 [*Carausius*]

[Brunei in ins. Borneo (Mus. Genav.).]

MHNG [36]: 1 ♀.

HT: ♀, Brunei, E Borneo, Staudinger.

[*Carausius cultratolobatus* Brunner v. Wattenwyl, 1907]

**dalawangsungay** Zompro sp. n. [*Lonchodes*]

Figs 43-45, 57

MHNG [39bis]: 1 ♀.

HT: ♀, Philippinen, Luzon, Imugan.

Description below.

**debilis** Redtenbacher, 1906: 146 [*Xera*]

[♂ ♀. Merida, Venezuela (Coll. m., Mus. Budapest): Columbien (Mus. Berlin).]

MHNG [16]: 1 ♂, 1 ♀.

PLT: 1 ♂, 1 ♀, Venezuela, Briceno, Merida; ex Mus. Hungar.

These specimens originate from the HNHM-collection before it was destroyed by fire in 1956.

MNHU [73/5]: 1 ♀.

PLT: 1 ♀, *Xera inermis* Redt.\* n. sp. Redtenbacher / Brunner det.; 788; Columb. Mor.

NHMW [7/34]: 5 ♂, 4 ♀.

LT, by present designation: ♂, Coll. Br.v.W. Merida Venezuela; det. Redtenb.

*Xera debilis*; PLT: ♀, 5 eggs ex abdomen, Coll. Br.v.W. Merida Venezuela; det. Redtenb. *Xera debilis*.

[*Xera debilis* Redtenbacher, 1906]



The LT designation is part of a revision of the genera of Phasmatodea: Areolatae by O. Zompro and will support nomenclatural stability.

**deplanata** Redtenbacher, 1908: 411 [*Bostra*]

[♀. Cuba (Mus. Genf).]

MHNG [60]: 1 ♀.

HT: ♀, Cuba, M. Poey, 620/88.

[*Phanocloidea* (?) *deplanata* (Redtenbacher, 1908)]

**divergens** Redtenbacher, 1908: 418 [*Bacteria*]

[Cayenne (Mus. Genf. Mus. Paris).]

MHNG [61]: 1 ♀.

ST: ♀, 2 eggs, Cayenne, Prudhomme, 620/85.

Further type-material in MNHN.

[*Phanocloidea muricata* (Burmeister, 1838), n. syn.]

**dohertyi** Carl, 1913: 46 [*Paroxyartes*]

Fig. 7

[1 ♂. Jobi. (Doherty leg.). Muséum de Genève.]

MHNG [76]: 1 ♂.

HT ♂: Jobi, Doherty, ex coll. Fruhstorfer.

[*Paroxyartes dohertyi* Carl, 1913]

**dubius** Carl, 1915: 185 [*Asprenas*]

[Neu-Caledonien. Mt. Ignambi, 29.IV.1911, 1 ♂, 1 ♀; Mt. Panié, 26.VI.1911, 1 ♂.]

MHNG [49]: 1 ♂.

ST ♂: 26.6.11, Panie Wald.

Further material in NHMB.

[*Asprenas dubius* Carl, 1915]

**effeminatus** Carl, 1913: 37 [*Asprenas*]

[1 ♂. Nova Caledonia. Muséum de Genève.]

MHNG [49]: 1 ♂.

HT: ♂: Nlle. Caledonie, Mr. Rolle.

[*Asprenas effeminatus* Carl, 1913]

**emortualis** Saussure, 1859: 61 [*Bacteria*]

[♀. Bahia.]

MHNG [59]: 1 ♀.

HT ♀: Bahia, Bresil.

[In collection as *Bactridium emortuale* (Saussure)]

**exornata** Redtenbacher, 1908: 405 [*Clonistria*]

[♂ ♀. Cuba. (Mus. Genf).]

MHNG [60]: 2 ♂, 2 ♀.

ST: 2 ♂, Cuba, Mr. H. d. Saussure; 2 ♀, Cuba.

[*Clonistria exornata* Redtenbacher, 1908]

**fecundus** Carl, 1915: 189, figs 3, 4 [*Brachyrhamphus*]

Figs 8-9

[Neu-Caledonien: Mt. Ignambi, 29.IV.1911, ♀ ad., ♂ ad.; Mt. Panié (Wald), ca. 500m, 26.VI.1911, ♀ ad.; Tao, 25.VI.1911, ♀ ad., ♂ ad.; Tiouaca-Tal, 23.VI-II.1911, ♀ juv.; Ciu, oberh. Canala, ca. 300m, 3.II.1912, ♂ ad.; Mt. Canala, ca. 750m, 4.XI.1911, ♀ juv.; Ngoi-Tal, 15.IX.1911, ♂ ad.]

MHNG [48]: 1 ♂, 1 ♀ nymph.

ST: ♂: Ngoyi, 15.9.11; ♀, nymph: Mt. Kanala, 4.11.11. [A second ♀ is present, not recorded by Carl: „Ilegrope, 3.3.12“]

Further material in NHMB.

[*Carlius fecundus* Carl, 1915]

***freygessneri*** Redtenbacher, 1908: 421 [*Bacteria*]

[♀. Guatemala (Mus. Genf).]

MHNG [61]: 1 ♀.

HT: ♀, Guatemala, Mr. H. d. Saussure, 2/14.

[*Phanocloidea freygessneri* (Redtenbacher, 1908)]

***fritzschei*** Zompro, 2000: 53, figs 9-21 [*Gratidia*]

[Holotypus (♂): Nakhon Ratchasima, Amphoe Pak Chong, Thanon Thannarat km 7, 300m, 101°24'50" E 14°36'50" N, 18.X.1997]. Data for paratypes, see Zompro (2000).

MHNG [30]: 1 ♂, 1 ♀.

PT: 1 ♂, Nakhon Ratchasima, Amphoe Pak Chong, Thanon Thannarat km 7, 300m, 101°24'50" E 14°36'50" N, auf *Acalypha wilkesiana* Muell., 17.XII.1997, leg. I. Fritzsche; 358-63 Coll. O. Zompro; 1 ♀, Nakhon Ratchasima, Amphoe Pak Chong, Thanon Thannarat km 6, 325m, 101°21' E 14°32' N, 16.I.1998, leg. I. Fritzsche; 358-117 Coll. O. Zompro.

Further type-material in BMNH, CUMZ, DEIC, MCSN, MNHN, NHMW, OX-UM, SMFD, SMTD, UMBB, ZMHB, ZMUH, Coll. I. Fritzsche, Coll. F. Hennemann, Coll. O. Zompro, affiliated with ZMUK.

[*Gratidia fritzschei* Zompro, 2000]

***fruhstorferi*** Carl, 1913: 29 [*Dixippus*]

[2 ♀. Insula Bawean (H. Fruhstorfer leg.). Muséum de Genève.]

MHNG [38]: 2 ♀.

ST: 2 ♀: Bawean, Regenzeit, Fruhstorfer.

[*Carausius fruhstorferi* (Carl, 1913)]

[In collection as *Phasgania fruhstorferi* (Carl)]

***fulvescens*** Saussure, 1868: 67 [*Anophelepis*]

[Insula Nouka-Hiva.]

MHNG [?]: Not traced.

[*Graeffea fulvescens* (Saussure, 1868)]

***glaber*** Redtenbacher, 1906: 167 [*Leocrates*]

[Sumatra (Mus. Genf).]

MHNG [19]: 1 ♀.

HT: ♀, Sumatra, Schneider.

[*Haaniella glaber* (Redtenbacher, 1906)]

***godeffroyi*** Redtenbacher, 1908: 360, pl. 16: 12 [*Nisyurus*]

[♀. Tongatabu, Freundschaftsinseln (Mus. Genf).]

MHNG [49]: 1 ♀.

HT: ♀, Tongatabu, Oceanie, H. d. Saussure.

[*Cotylosoma godeffroyi* (Redtenbacher, 1908)]

**godmani** Redtenbacher, 1908: 411 [*Bostra*] Figs 33-34

[♀. Nicaragua (Coll. m.), Costa Rica (Mus. Genf), Guatemala (Coll. Godman).]

MHNG [60]: 1 ♀

ST: 1 ♀, 1 egg: Costa Rica, Amer. cent., Mr. P. Biolley, 620/76.

Further type-material in BMNH and NHMW.

[*Alienobostra godmani* (Redtenbacher, 1908)]

**guadeloupensis** Redtenbacher, 1908: 404 [*Clonistria*]

[♂. Guadeloupe (Coll. m.), Guatemala (Mus. Stuttgart). ♀: Guadeloupe (Mus. Genf).]

MHNG [60]: 2 ♀.

ST: 2 ♀, Guadeloupe, Mr. H. d. Saussure.

Further type-material in NHMW and SMNS and MNHN.

[*Clonistria guadeloupensis* Redtenbacher, 1908]

**guatemalensis** Redtenbacher, 1908: 405 [*Clonistria*]

Figs 10-11

[♂. Guatemala (Mus. Genf).]

MHNG [60]:

LT, by present designation: ♂, Guatemala, Mr. H. d. Saussure, 2/14.

PLT: ♂, Guatemala, Mr. H. d. Saussure, 3/28.

Further type-material in ZMHB.

[*Clonistria guatemalensis* Redtenbacher, 1908]

The two specimens belong to different genera. The LT designation is part of a revision of South American genera of Phasmatodea by O. Zompro and will support nomenclatural stability.

**guerini** Saussure, 1868: 64 [*Pygirhynchus*]

[Insula Guadalupe.]

MHNG [50]: 2 ♂, 1 ♂ nymph, 4 ♀.

ST: 2 ♂, 1 ♂ nymph, 4 ♀: Guadeloupe, H. d. Saussure.

[*Lamponius guerini* (Saussure, 1868)]

**hasenpuschorum** Brock gen. n., sp. n. [*Parapodacanthus*]

MHNG : 1 ♂.

PT: Cairns, "Nov. Holl".

HT and further PT in QMBA, ANIC and Coll. P. D. Brock.

Description below.

**horridum** Carl, 1913: 3 [*Acanthoclonia*]

[1 ♂. Banos, Ecuador. Muséum de Genève.]

MHNG [4]: 1 ♂.

HT ♂: Baños, Ecuador.

[*Acanthoclonia horrida* Carl, 1913]

**humberti** Saussure, 1861a: 472 [*Bacillus* (*Ramulus*)]

[♂ ♀. L'île de Ceylan, par M. A. Humbert.]

MHNG [29]: 1 ♂, 2 ♀.

LT, by present designation: 1 ♂, PLT : 2 ♀: Trincomalie, Ceylon, Voyage Humbert.

[*Ramulus humberti* (Saussure, 1861)]

[In collection as *Dubreulia humbertiana* (Saussure).]

Comment. This is the type-species of *Ramulus* Saussure, 1861. Most of the species belonging to this genus erroneously have been treated as members of *Baculum* Saussure, 1861 (Type: *Baculum ramosum* Saussure, 1861), a monotypic genus from Brazil. See also comments under *ramosum*. To support stability in the use of the names in the future, a lectotype is here designated for *R. humberti*.

***humberti*** Carl, 1913: 13 [*Clitumnus*]

[1 ♂. Ceylan.]

MHNG [25]: 1 ♂.

HT ♂: Ceylon, Schilling, ex coll. Fruhstorfer.

[*Ramulus carli* Zompro, **nom. n.**]

Comment. This species is a member of *Ramulus* Saussure, 1861, type-species: *Ramulus humberti* (Saussure, 1861), and therefore requires a new name.

***humbertiana*** Saussure, 1868: 68 [*Necroscia*]

[Ceylon.]

MHNG [87]: 2 ♀.

ST: 2 ♀: Ceylon, Humbert.

[*Sosibia humbertiana* (Saussure, 1868)]

***imbellis*** Brunner v. Wattenwyl, 1907: 312 [*Ocnophila*]

[♀. ? (Mus. Genav.)]

MHNG [41]: 3 ♀.

ST: 3 ♀: ♂ Amerique, coll. Guerin.

Comment. The specimens are labelled as ♂, but all three type specimens are in fact ♀.

***impennis*** Carl, 1913: 36 [*Asprenas*]

[1 ♀. Nova Caledonia. Muséum de Genève.]

MHNG [49]: 1 ♀.

HT ♀: Nlle. Caledonie, Mr. Rolle.

[*Asprenas impennis* Carl, 1913]

Comment. A ♂ with same data also present, neither recorded nor described by Carl.

***incerta*** Carl, 1913: 54 [*Aruanoidea*]

[3 ♂. Than-Moi, Tonkin. Muséum de Genève.]

MHNG [86]: 3 ♂.

ST: 3 ♂: Tonkin, Than-Moi, Jan.-Juli, Fruhstorfer.

[*Necroscia incerta* (Carl, 1913)]

***inconspicuus*** Brunner v. Wattenwyl, 1907: 334 [*Bacunculus*]

[♂. Costa Rica (Mus. Genav., Coll. m.), Mexico (Mus. Paris).]

MHNG [45]: 2 ♂.

ST: 2 ♂, Costa Rica, Amer. Centr., P. Biolley.

Further type-material in NHMW and MNHN.

[*Pseudosemyla inconspicua* (Brunner v. Wattenwyl, 1907)]

***ingens*** Redtenbacher, 1908: 453 [*Pharnacia*]

[♀. Malabar, Meppadi (Mus. Genf); Ober-Tenasserim 4000-6000' (Wood-Mas.).]

MHNG [69]: 1 ♀.

ST: ♀, Meppadi, Malabar, Mr. Atzenwiller.

Further type-material in the Wood-Mason collection, which is now possibly in New Delhi, India.

[*Pharnacia ingens* Redtenbacher, 1908]

**ingerens** Brunner v. Wattenwyl, 1907: 206 [*Cuniculina*]

[♀. Java (Mus. Genav.).]

MHNG [26]: 1 ♀.

HT: ♀, Java, Fruhstorfer.

[*Ramulus ingerens* (Brunner v. Wattenwyl, 1907)]

**insignis** Redtenbacher, 1906: 90 [*Paranisomorpha*]

Fig. 14

[♂♀. Costa Rica, Zentral-Amerika (Mus. Genf [♂], Coll. m, Coll Goudot [♀]).]

MHNG [8]: 1 ♀.

♀, syntype: Costa Rica, Amer. Cent, Biolley.

Not ♂, as recorded by Redtenbacher. Further type-material in BMNH, NHMW.

[*Paranisomorpha insignis* Redtenbacher, 1906]

**intermedia** Carl, 1913: 40 [*Bostra*]

[1 ♀. Guatemala. Muséum de Genève.]

MHNG [60]: 1 ♀.

HT ♀: Guatemala, H. d. Saussure.

[*Phanocles intermedius* (Carl, 1913)]

**jamaicana** Zompro, 2001a: 214, figs 48-49, 96-97, 132-133 [*Caribbiopheromera*]

[HT ♂, Jamaica, PSG-culture, origin: Jamaica. Culture O. Zompro VII.1995 (MHNG, ex coll. O. Zompro 118-2); PT: 1 ♀, 2 eggs (MHNG, ex coll. O. Zompro 118-5); 2 ♂, 3 ♀, several eggs: as HT (OZ 118-1, 3-4, 6-7); 1 ♂, 3 ♀ (Coll. F. Hennemann 61-1-4).]

MHNG : 1 ♂, 1 ♀, 2 eggs.

HT: ♂, Zucht O. Zompro VII.1995; 118-2 Coll. O. Zompro;

PT: 1 ♀, Zucht O. Zompro VII.1995; 118-5 Coll. O. Zompro.

Further type-material in Coll. O. Zompro, affiliated with ZMUK, and Coll. F. Hennemann.

[*Caribbiopheromera jamaicana* Zompro, 2001]

**jurinei** Saussure, 1868: 69 [*Metriotes*]

[No locality mentioned.]

MHNG [15]: 1 ♀.

HT: ♀: Amasm, Jurinei. 3 ♂, not referred to by Saussure, also present.

[*Isagoras jurinei* (Saussure, 1868)]

**linearis** Saussure, 1868: 65 [*Ceroys*]

[America meridionalis.]

MHNG [?]: Not traced.

**lobulatus** Carl, 1913: 12 [*Eucarcharus*]

[1 ♀. Ceylon. Muséum de Genève.]

MHNG [24]: 1 ♀.

HT ♀: Ceylon.

[*Eucarcharus lobulatus* Carl, 1913]

**lobulatus** Redtenbacher, 1908: 351 [*Laciphorus*]

[♀. Lima, Peru (Mus. Genf).]

MHNG [?]: Not traced.

[*Laciphorus lobulatus* Redtenbacher, 1908]

**longimana** Saussure, 1859: 61 [*Bacteria*]

[Bahia.]

MHNG [59]: 2 ♂.

ST: 2 ♂: Amer. merid.

[In collection as *Bactridium longimanum* (Saussure).]

**longiscapha** Redtenbacher, 1908: 435 [*Diapherodes*]

[♀. Portorico (Mus. Berlin, Mus. Genf).]

MHNG [65]: 1 ♀.

ST: Porto-Rico, Antilles, Mr. H. de Saussure.

Further type-material in ZMHB.

[*Diapherodes longiscapha* Redtenbacher, 1908]

**magayon** Zompro sp. n. [*Lonchodes*]

Figs 41-42, 56

MHNG [39bis]: 1 ♂.

HT: ♀, Philippinen, Luzon, Mt. Banahao.

Description below.

**malacca** Saussure, 1868: 69 [*Necroscia*]

Fig. 16

[Malacca.]

MHNG [81]: 1 ♀.

HT ♀: Indes or., Anc. coll.

[*Asceles malacca* (Saussure, 1868)]

**melanocephala** Carl, 1913: 18 [*Cuniculina*]

[2 ♂. Lompa-Battau, Celebes merid. 3000'; 1 ♂. Bua-Kraeng, Celebes merid. 5000'. Muséum de Genève.]

MHNG [26]: 3 ♂.

ST: 2 ♂: S. Celebes: Lompa-Battau, 3000 ft., III.1896, Fruhstorfer; 1 ♂: Bua-Kraeng, 5000 ft., III.1896, Fruhstorfer.

[*Ramulus melanocephalus* (Carl, 1913)]

**melanocephala** Carl, 1913: 5 [*Orobia*]

[5 ♂. Madagascar. Muséum de Genève.]

MHNG [6]: 5 ♂.

ST: 5 ♂: Madagascar, H. d. Saussure.

[*Leiophasma melanocephala* (Carl, 1913)]

**mexicanus** Saussure, 1859: 62 [*Acanthoderus*]

[Mexico.]

MHNG [41]: 1 ♀.

HT ♀: Mexico, Potrero.

[*Sermyle mexicana* (Saussure, 1859)]

[In collection as *Ocnophila mexicana* (Saussure)]

**mexicanus** Saussure, 1859: 63 [*Prisopus*]

[Mexico.]

MHNG [16]: 1 ♀.

HT ♀: Mirador, Mexique.

[*Prisopus mexicanus* Saussure, 1859]

(In collection as *Prisopus berosus* Westwood.)

**minor** Carl, 1913: 26 [*Pseudostheneboea*]

[2 ♂. Khasi-Hills, Assam. Muséum de Genève.]

MHNG [33]: 2 ♂.

ST: 2 ♂: Khasi Hills.

[*Pseudostheneboea minor* Carl, 1913]

**minuta** Redtenbacher, 1908: 480 [*Parasipyloidea*]

[♀. Ceylon (Mus. Genf).]

MHNG: Not traced.

[*Parasipyloidea minuta* Redtenbacher, 1908]

**modesta** Brunner v. Wattenwyl, 1907: 206 [*Cuniculina*]

[♀. Java (Mus. Genav., Mus. Hamb., Mus. Budap.), Java orient. (Mus. Berol.)]

MHNG [26]: 1 ♀.

ST: 1 ♀, Java, Fruhstorfer.

Further type-material in ZMHB and ZMUH. HNHM material was lost in fire in 1956.

[*Ramulus modestus* (Brunner v. Wattenwyl, 1907)]

**modesta** Carl, 1913: 6 [*Orobia*]

[1 ♂. Madagascar. Muséum de Genève.]

MHNG [5]: 1 ♂.

HT ♂: Madagascar, H. d. Saussure.

[*Leiophasma modesta* (Carl, 1913)]

**monticola** Carl, 1913: 41 [*Bacteria*]

[1 ♀. Costa-Rica (?) (W. Pittier leg.). Muséum de Genève.]

MHNG [61]: 1 ♀.

HT ♀: Costa Rica, Buenos Aires a Calamanca, W. Pittier, 12.IV.97.

[*Phanocloidea monticola* (Carl, 1913)]

**moricula** Redtenbacher, 1908: 545 [*Sipyloidea*]

[♂. Kina-Balu, Brunei, Borneo (Coll. m., Mus. Genf).]

MHNG [90]: 2 ♂.

ST: 1 ♂, Borneo, Iles de Sonde, Mr. Fruhstorfer, 620/27; 1 ♂, Brunei, E Borneo, Staudinger.

Further type-material in NHMW.

[*Sipyloidea moricula* Redtenbacher, 1908]

**munda** Redtenbacher, 1908: 525 [*Aruanoidea*]

[♂ ♀. Philippinen (Coll. m., Mus. Genf).]

MHNG [84]: 1 ♀.

ST: ♀, Philippines.

Further type-material in NHMW.

[*Necroscia munda* (Redtenbacher, 1908)]

[In collection as *Necroscia munda* (Redtenbacher)].

**mystica** Brunner v. Wattenwyl, 1907: 233, pl. 9: 8 [*Zehntneria*]

[♀. Promont. Bonae Spei (Mus. Genav.).]

MHNG [31]: 1 ♀.

HT: ♀, Cap. b. sp., Peringuey.

[*Zehntneria mystica* Brunner v. Wattenwyl, 1907]

Comment. Cap. b. sp. refers to Cape of Good Hope, Republic of South Africa.

**nanus** Carl, 1913: 52, pl. 1: 9 [*Paramenexenus*]

[1 ♂, 1 ♀. Tonkin. Muséum de Genève.]

Type-series: 1 ♂, 1 ♀.

MHNG [76]: 1 ♂, ♀.

ST: 1 ♂, ♀, syntypes: Tonkin, Baudet.

[*Paramenexenus nanus* Carl, 1913]

**nuptialis** Redtenbacher, 1908: 410 [*Bostra*]

[♂, Guyana (Mus. Genf.).]

MHNG [?]: Not traced.

**obtusicornuta** Redtenbacher, 1908: 409 [*Bostra*]

[♂ ♀. Guatemala (Coll. m. Alk.), Costa Rica (Mus. Berlin, Mus. Genf, Coll. m.).]

MHNG [60]: 1 ♂.

ST: 1 ♂, Costa Rica, Amer. merid., Mr. P. Biolley.

Further type-material in NHMW and ZMHB.

[*Paracalynda* (?) *obtusicornuta* (Redtenbacher, 1908)]

**occipitalis** Carl, 1913: 4 [*Orobia*]

[♀ ♀. Madagascar. Muséum de Genève.]

MHNG [6]: 5 ♀.

ST: 5 ♀: Madagascar, H. d. Saussure. [All ♀ seem to be types; Carl did not refer to a definite number]

[*Leiophasma occipitalis* (Carl, 1913)]

**olmeca** Saussure, 1869: 156 [*Bacteria*]

[♂. Le Mexique. Cordillère orientale.]

MHNG [45]: 1 ♂.

HT ♀: Mexique.

[*Pseudosermyle olmeca* (Saussure, 1859)]

[In collection as *Bacunculus olmecus* (Saussure)]

**palawanica** Carl, 1913: 30 [*Prisomera*] Figs 35-36

[1 ♀. Palawan. Muséum de Genève.]

MHNG [39]: 1 ♀, 1 egg ex ovipositor.

HT ♀, 1 egg ex ovipositor: Philippines, Palawan, 1898, Doherty, ex coll. Fruhstorfer.

[*Stheneboea palawanica* (Carl, 1913) comb. n.]

[In collection as *Lonchodes palawanica* (Carl)].

Comment. The egg is described below.

**parvulus** Carl, 1913: 27 [*Acacus*]

[♂ ♂. Java (Dr. L. Zehntner leg.). Muséum de Genève.]



MHNG [35]: 8 ♂.

ST: 8 ♂: Java, Zehntner.

Further material in ANSP.

[*Parasipyloidea aenea* (Carl, 1913), synonymised by Günther, 1934: 529.]

**parvulus** Carl, 1913: 35 [*Bacunculus*]

[1 ♂. San Pedro Sula, Honduras. Muséum de Genève.]

MHNG [45]: 1 ♂.

HT ♂: Honduras, San Pedro Sula, ex coll. Fruhstorfer.

[*Pseudosermyle parvula* (Carl, 1913)]

**parvulus** Carl, 1913: 24, pl. 1: 12, 13 [*Micrarchus*] Figs 12-13

[1 ♂ Greymouth, 1 ♂ Heteraunga (Nova Seelandia). Muséum de Genève.]

MHNG [29]: 2 ♂.

ST: ♂: Greymouth, Nlle. Zealand, Helms; ♂: Nov. Zealand, Heteraunga.

[*Micrarchus hystriculeus* (Westwood, 1859), synonymized by Salmon, 1999: 88.]

Comment. Salmon (1991: 88) synonymized *Micrarchus* Carl, 1913 (not of Kaup) (Type-species: *Micrarchus parvulus* Carl, 1913: 24, by monotypy) with *Pachymorpha* Gray, 1835 (Type-species: *Bacillus squalidus* Gray, 1833: 18, by monotypy). The genitalia of these genera show striking differences, therefore *Micrarchus* is re-established as a valid genus. The terminal abdominal segments of a pair of *Pachymorpha squalida* (Gray, 1835) from New South Wales [MHNG] are figured in figs 31-32.

**pedestris** Redtenbacher, 1908: 540 [*Candaules*]

[♀. Java (Mus. Genf.).]

MHNG [87]: 1 ♂.

HT: ♂, Java, H. d. Saussure.

[*Lopaphus pedestris* (Redtenbacher, 1908)]

**peruana** Saussure, 1868: 65 [*Bacteria*]

[Peru.]

MHNG [42]: 2 ♂.

LT: ♂: Iquitos, Perou, 600/81, Anc. coll. PLT: ♂: Perou.

[*Oreophoetes peruana* (Saussure, 1868)]

[In collection as *Allophyllus peruanus* (Saussure)]

Comment. Also 1 ♂ and 1 ♀ from Baños, Ecuador present, but not referred to by Saussure.

LT designated by Zompro, 2002: 146.

**picteti** Redtenbacher, 1908: 522 [*Aruanoidea*]

[♂, Borneo (Mus. Genf.).]

MHNG [84]: 1 ♂.

HT: ♂, Borneo, Iles de Sonde, Mr. C. Pictet.

[*Scionecra picteti* (Redtenbacher, 1908)]

**poeyi** Saussure, 1868: 67 [*Anophelepis*] Figs 17, 58

[Insula Cuba.]

MHNG [14]: 2 ♀.

LT, by present designation: ♀: Cuba, acheté a M. Poey; PLT: 1 ♀, ♀: Cuba,

acheté a M. Poey; 3 ♀: Cuba, M. H. de Saussure.

[*Alloeophasma poeyi* (Saussure, 1868)]

Comment. This lectotype designation is part of a revision of the Phasmatodea: Areolatae by O. Zompro and will support nomenclatural stability.

**poeyi** Saussure, 1868: 68 [*Creoxylus*]

[Larva. Cuba.]

MHNG [16]: 1 ♂ nymph.

HT ♂, nymph: Cuba, Antilles, acheté a M. Poey.

[*Creoxylus poeyi* Saussure, 1868]

**prima** Zompro, 1999: 124, figs 1-3 [*Microphasma*]

[Ceylan (Central), Horton plains, 2100m, 15.II.1970, leg. C. Besuchet / I. Löbl]

MHNG [33]: 1 ♀

HT: ♀, Ceylan (Central), Horton plains, 2100m, 15.II.1970, leg. C. Besuchet / I. Löbl.

[*Microphasma prima* Zompro, 1999]

**proximus** Carl, 1913: 28 [*Carausius*]

[1 ♂. Java, Dr. L. Zehntner. Muséum de Genève.]

MHNG [36]: 1 ♂.

HT: ♂: Java, Zehntner.

**pulchrepecta** Carl, 1913: 22 [*Gratidia*]

Figs 18-19

[1 ♂. Promont. Bonae Spei. Muséum de Genève.]

MHNG [30]: 1 ♂.

HT ♂: Cap b. Sp., Peringuey.

[*Gratidia pulchrepecta* Carl, 1913]

Cap. b. sp. refers to Cape of Good Hope, Republic of South Africa.

**pusillus** Redtenbacher, 1906: 61 [*Ceroys*]

[♂. Peru (Mus. Genf)]

MHNG [4]: 1 ♂.

HT: ♂, Peru.

[*Ceroys pusillus* Redtenbacher, 1906]

**putingmantsa** Zompro sp. n. [*Lonchodes*]

Figs 37-40, 54-55

MHNG [39bis]: 1 ♂, 1 ♀.

HT: ♂, Philippinen, Aroroy.

PT: 1 ♀, Philippinen, Aroroy.

Description below.

**quitensis** Saussure, 1868: 69 [*Phasma*]

[Aequator.]

MHNG [13]: 1 ♀.

HT ♀: Quito, Perou, H. de Saussure.

[*Pseudophasma quitensis* (Saussure, 1868)]

**rachis** Saussure, 1868: 64 [*Acanthoderus*]

Figs 20-21

[Nova Caledonia.]

MHNG [49]: 4 ♂, 1 ♀.

ST: 4 ♂, 1 ♀: Nlle. Caledonie, Oceanie, Mr. Deyrolle.

[*Cnipsus rachis* (Saussure, 1868)]

**ramosum** Saussure, 1861b: 127 [*Bacillus* (*Baculum*)]

[♀. Brasilia]

MHNG [?]: Not traced.

[*Baculum ramosum* (Saussure, 1868)]

Comment. This species is the type of the problematic genus *Baculum* Saussure, 1861. *Baculum ramosum* originates from Brazil, while all other species described in "*Baculum*" are from Asia. Furthermore, *Baculum ramosum* shows a character not present in any species described in this genus subsequently. All these species actually belong in *Ramulus* Saussure, 1861, and, to avoid further confusion, are listed within this genus. A revision of the whole genera around *Baculum* and *Ramulus* is in progress by Zompro.

**reclusa** Brunner v. Wattenwyl, 1907: 327 [*Dyme*]

[Terra caliente in Mexico. (Sauss., Mus. Genav., Coll.m.)]

MHNG [44]: 1 ♀.

ST: 1 ♀, Mexico.

Further type-material in NHMW.

**rossia** Rossi, 1788: 259, pl. 8: 1 [*Pseudomantis*]

MHNG [coll. Harz 1A]: 1 ♀.

NT: ♀, Spanien, Port Bon, 28.5.66, Dr. Eckerlein leg.

Invalid neotype designation for a species described from Pisa, Italy - correct neotype designated by Capra & Poggi (1980). Specimen deposited in MCSN.

[*Bacillus rossius* Rossi, 1788]

**rouxi** Carl, 1915: 174, 187, fig. 1 [*Labidiophasma*]

Fig. 22

[Ngori-Tal, 15.X.1911, 2 ♀.]

MHNG [48]: 1 ♀.

ST: ♀, Ngoye, 15.9.11.

Further material in NHMB.

[*Labidiophasma rouxi* Carl, 1915]

**rubescens** Saussure, 1868: 68 [*Necroscia*]

Fig. 23

[Malacca.]

MHNG [83]: 1 ♀.

HT ♀: Malacca, Indes, Guerin.

[*Marmessoidea rubescens* (Saussure, 1868)]

[In collection as *Trigonophasma rubescens* (Saussure)]

**rubus** Saussure, 1861 [*Cladoxerus*]

[♀. Brasilia. (Bahia.)]

MHNG [63]: 3 ♀ ♀.

ST: 2 ♀: Bresil; ♀: without label.

[*Cladomorphus rubus* (Saussure, 1861)]

[In collection as *Phibalosoma rubus* (Saussure)]

**rufopectus** Redtenbacher, 1908: 416 [*Bacteria*]

[♂. Cayenne (Mus. Genf).]

MHNG [61]: 1 ♂.

HT: ♂, Cayenne, Prudhomme, 620/85.

[*Phanocloidea rufopectus* (Redtenbacher, 1908)]

- saginata*** Redtenbacher, 1906: 86, pl. 4:10 [*Dina*]  
 [♂ ♀. Borneo, Brunnei, Kina ]  
 MHNG [8]:  
 ST: ♂, Brunnei, E Borneo, Staudinger.  
 Further type-material in NHMW.  
 [*Dinophasma saginata* (Redtenbacher, 1906)]
- saussurei*** Kirby, 1904: 397 [*Haaniella*]  
 [nom. n.]  
 MHNG. [19]: 1 ♀.  
 HT: ♀, Coll. Guerin.  
 [*Haaniella saussurei* Kirby, 1904]  
 (In collection as *Heteropteryx saussurei* Redtenbacher.).  
 Comment. Introduced as a name for *Heteropteryx grayi* var. Saussure, 1869: 310, which subsequently was also named *saussurei* by Redtenbacher, see below.
- saussurei*** Redtenbacher, 1906: 171 [*Heteropteryx*]  
 [♀. Sunda-Inseln (Mus. Genf); Borneo (Hofmus. Wien, Mus. Budapest, Mus. Genua.)]  
 MHNG [19]: 1 ♀.  
 ST: ♀, Coll. Guerin.  
 Further type-material in HNHM, NHMW and MCSN.  
 [*Haaniella saussurei* Kirby, 1904]  
 [In collection as *Heteropteryx saussurei* Redtenbacher]  
 Comment. The same specimen as the above mentioned holotype of *Haaniella saussurei* Kirby, 1904, being type-specimen of both authors.
- saussurei*** Bolívar, 1888: 136 [*Phantasis*]  
 [♀. Cuba. No. 104 ♀ de la coll. Gundlach.]  
 MHNG [49]: 1 ♀.  
 ST: ♀, Cuba, Saussure.  
 Further type-material in MNMS.  
 [*Hesperophasma saussurei* (Bolívar, 1888)]  
 [In collection as *Phantasis planula* (Westwood)]
- schauinslandi*** Brunner v. Wattenwyl, 1907: 238, pl. 10: 3a, b [*Argosarchus*]  
 [♀. Ins. Chatam prope N. Seelandiam (Mus. Bremense), N. Seelandia (Mus. Berol., Mus. Genav.)]  
 MHNG [32]: 1 ♀.  
 ST: 1 ♀, New Zealand, Greymouth, Helms.  
 Further type-material in UMBB and ZMHB.  
 [*Argosarchus horridus* (White, 1846), synonymized by Salmon, 1991: 48.]
- schneideri*** Werner, 1918: 268 [*Battacus*]  
 [Bintang Mariah, Montes Battak.]  
 MHNG [82]: 1 ♀.  
 HT: ♀, Sumatra, Binthang Mariah, Mt. Battak.  
 [*Tagesoidea nigrofasciata* Redtenbacher, 1908, synonymized by Brock, 1990: 14.]

- schulthessi*** Carl, 1913: 21, pl. 1: 7, 8 [*Paraleptinia*] Figs 24-27  
 [1 ♀. Promont. Bonae Spei. Muséum de Genève.]  
 MHNG [30]:  
 HT ♀: Cap b. Sp., Peringuey.  
 [*Paraleptinia schulthessi* (Carl, 1913)]  
 Cap. b. sp. refers to Cape of Good Hope, Republic of South Africa.
- scutatus*** Carl, 1913: 49, pl. 1: 1, 3 [*Andropromachus*] Fig. 28  
 [1 ♀. Tonkin. Muséum de Genève.]  
 MHNG [77]: 1 ♀.  
 HT ♀: Tonkin, Baudet.  
 [*Andropromachus scutatus* Carl, 1913]
- secunda*** Carl, 1913: 31 [*Libethra*]  
 [1 ♂. Merida, Venezuela. Muséum de Genève.]  
 MHNG [41]: 1 ♂.  
 HT ♂: Venezuela, Merida.  
 [*Rugosolibethra secunda* (Carl, 1913)]
- segregata*** Carl, 1913: 26, pl. 1: 2 [*Pseudostheneboea*] Fig. 29  
 [1 ♂. Khasi-Hills, Assam. Muséum de Genève.]  
 MHNG [33]: 1 ♂.  
 HT ♂, holotype: Khasi Hills. [A second ♂ with same data is present, but not referred to by Carl]  
 [*Pseudostheneboea segregata* Carl, 1913)]
- soror*** Carl, 1913: 32 [*Libethra*]  
 [1 ♀. Merida, Venezuela. Muséum de Genève.]  
 MHNG [41]: 1 ♀.  
 HT ♀: Merida.  
 [*Rugosolibethra soror* (Carl, 1913)]
- speiseri*** Carl, 1915: 193 [*Megacrania*]  
 [Malo, XI.1911, 8 ♀ ad., 2 ♀ juv.]  
 MHNG [51]: 1 ♀.  
 ST ♀: Malo (N. Hebr.), Dr. Speiser.  
 Further material in NHMB.  
 [*Megacrania batesii speiseri* Carl, 1915]  
 (In collection as *Megacrania batesi* var. *speiseri* Carl.)
- speiseri*** Carl, 1915: 193 [*Hermarchus*]  
 [Mal, XI.1911, 2 ♀; Ambrym, III.1911, 2 ♀.]  
 MHNG [68]: 1 ♀.  
 ST: ♀: Malekula, Neue Hebriden, Mai 1911, D. Speiser.  
 Further material in NHMB.  
 [*Hermarchus inermis speiseri* Carl, 1915]
- spinigera*** Saussure, 1859: 62 [*Bacteria*]  
 [♂. Brasilia.]  
 MHNG [?]: Not traced.  
 [*Canuleius euterpinus* (Westwood, 1859), synonymized by Kirby, 1904: 353.]

***spinipennis*** Carl, 1913: 47 [*Oxyartes*]

[1 ♂. Tonkin. Muséum de Genève.]

MHNG [76]: 1 ♂.

HT ♂: Tonkin, Baudet.

[*Oxyartes spinipennis* Carl, 1913]***spinosissimus*** Carl, 1913: 46 [*Oxyartes*]

[1 ♂. Tonkin. Muséum de Genève.]

MHNG [76]: 1 ♂.

HT ♂: Tonkin, Baudet.

[*Oxyartes spinosissimus* Carl, 1913]***spinosus*** Saussure, 1868: 68 [*Lopaphus*]

Fig. 30

[Malacca.]

MHNG [79]: 1 ♂.

HT ♂: Malacca, Indes, Guerin.

[*Centrophasma spinosum* (Saussure, 1868)]***subintegra*** Carl, 1913: 20 [*Medaura*]

[1 ♀. Khasi-Hills, Assam. Muséum de Genève.]

MHNG [30]: 1 ♀.

HT ♀: Khasi Hills, Assam.

[*Medaura scabriuscula* (Wood-Mason, 1873), synonymized by Brock & Cliquennois, 2000: 15.]***submarginata*** Redtenbacher, 1908: 532 [*Diacanthoidea*]

[♂ ♀. Sumatra (Mus. Genf); Perak (Mus. Hamburg, Westw.).]

MHNG [86]: 2 ♂.

ST: 2 ♂, Sumatra, Iles de Sonde, Dr. H. Dohrn.

Further type-material in NHMW and ZMUH.

[*Diacanthoidea diacanthos* (de Haan, 1842), synonymized by Brock, 1995: 88.]***sumatranus*** Brunner v. Wattenwyl, 1907: 184 [*Phobaeticus*]

[♀. Sumatra (Mus. Genav.), Indraviri in ins. Sumatra (Mus. Basil.).]

MHNG [23]: 1 ♀.

ST: ♀, Sumatra, Lakat, acheté d. M. Schneider.

Further type-material in NHMB.

[*Pharnacia sumatrana* (Brunner v. Wattenwyl, 1907)]***superbus*** Carl, 1913: 15 [*Clitumnus* (?)]

[2 ♂. Than-Moi, Tonkin. Muséum de Genève.]

MHNG [25]: 2 ♂.

ST: 2 ♂, Tonkin, Than-Moi, Jan.-Juli, Fruhstorfer.

[*Ramulus superbus* (Carl, 1913)]***suspecta*** Carl, 1913: 55 [*Calvisia*]

[1 ♀. Bornéo sept. Muséum de Genève.]

MHNG [93]: 1 ♀.

HT ♀: Nord Borneo, ex coll. Fruhstorfer.

[*Calvisia suspecta* Carl, 1913]***tarsatus*** Carl, 1913: 23 [*Mimarchus*]

[3 ♀. Greymouth, Blue Cliffs, Nova Seelandia. Muséum de Genève.]

MHNG [31]: 3 ♂.

ST: ♂: Nov. Zealand; ♂: Nlle. Zealand, Marcet; ♂: Greymouth, Blue Cliffs, Nlle. Zealand, Helms.

[*Mimarchus tarsatus* Carl, 1913]

Comment. Jewel & Brock (in press) have corrected the present classification.

**thomae** Saussure, 1868: 64 [*Pygirhynchus*]

[Insula Saint-Thomas.]

MHNG [?]: Not traced.

[*Agamemnon thomae* (Saussure, 1868)]

**tolteca** Saussure, 1859: 62 [*Bacteria*]

[♂. Montes mexicani.]

MHNG [?]: Not traced.

**transiens** Redtenbacher, 1908: 539, pl. 26: 7 [*Candaules*]

[♂ ♀. Java (Coll. m., Mus. Genf, Mus. Hamburg, Mus. Berlin, Mus. Budapest).]

MHNG [87, 88]:

ST: [Drawer 87] 5 ♂, 9 ♀, [Drawer 88] 13 ♂, Zehntner, Java.

Further type-material in HNHM, NHMW, ZMHB and ZMUH.

[*Lopaphus transiens* (Redtenbacher, 1908)]

**triangulifera** Redtenbacher, 1906: 124, pl. 5: 2 [*Oestrophora*]

[♂ ♀. Surinam, Cayenne (Mus. Paris, Mus. Genf, Coll. m.)]

MHNG [14]: 1 ♂.

ST: 1 ♂, Surinam, Amer. mer., coll. Jurin.

Further type-material in MNHN and NHMW.

[*Oestrophora triangulifera* Redtenbacher, 1906]

**tricolor** Redtenbacher, 1908: 570 [*Calvisia*]

[♀. Sumatra (Coll. m.); Brunei, Borneo (Mus. Genf).]

MHNG [93]: 1 ♀.

PLT: 1 ♀, Brunei, E Borneo, Staudinger.

LT in NHMW.

[*Calvisia hemus* (Westwood, 1859), synonymized by Brock, 1995: 87.]

Comment. LT designated by Brock, 1995: 87.

**trilineatus** Carl, 1913: 28 [*Myronides*]

[♂ ♂. Silhet, Assam. Muséum de Genève.]

MHNG [35]: 5 ♂.

ST: 5 ♂: Silhet, Assam.

[*Lopaphus trilineatus* (Carl, 1913) comb. n.]

**unicolor** Carl, 1913: 8, pl. 1: 10 [*Eucles* (?)]

[1 ♂, 1 ♀. La Palma, 1600m, Costarica. (P. Biolley leg.). Muséum de Genève.]

MHNG [10]: 1 ♂, 1 ♀.

ST: 1 ♂, 1 ♀: Costa Rica, La Palma, 1600m, Biolley.

[*Eucles unicolor* Carl, 1913]

**unispinosa** Carl, 1913: 1 [*Antongilia*]

[1 ♂, Madagascar. Muséum de Genève.]

MHNG [1]: 1 ♂.

HT ♂: Madagascar, V. Heyden.

[*Antongilia unispinosa* Carl, 1913]

**verruculosa** Brunner v. Wattenwyl, 1907: 248 [*Stheneboea*]

[♂. Java (Coll. m., Mus. Genav.), Perak (Coll. m.)]

MHNG [33]: 9 ♂.

PLT: 9 ♂, Java, Zehntner.

Also 5 undescribed ♀ with same data. Further type-material in NHMW.

[*Stheneboea verruculosa* (Brunner v. Wattenwyl)]

LT in NHMW designated by Brock (1995: 86). The Java material is considered to represent a different species by Brock (1995: 86).

**virescens** Redtenbacher, 1906: 83 [*Abrosoma*]

[♂ ♀. Ceylon (Coll. m.); Andamanen (Hofmus. Wien); Sumatra (Mus. Genf).]

MHNG [?]: Not traced.

A specimen that is possibly a type in NHMB. Further type-material in NHMW.

[*Abrosoma virescens* Redtenbacher, 1906]

LT designated by Brock, 1998a: 64.

**viridis** Zompro, 1998: 163, fig. 10 [*Breviphetes*]

[Holotypus: ♂, (Neuguinea) Kaiser Wilhelmsland, Torricelli-Gebirge, 1910, Dr. Schlaginhaufen (MHNG). - Allotypus: ♀, Daten wie Holotypus (SMTD).]

MHNG [33]: 1 ♂.

HT: ♂, Kais. Wilhelmsland, Toricelli Gebirge, 780m, Dr. Schlaginhaufen.

Further material in SMTD.

[*Breviphetes viridis* Zompro, 1998]

**yersiniana** Saussure, 1868: 65 [*Bacteria*]

[Porto-Rico.]

MHNG [43]: 1 ♂.

HT: ♂, Puerto Rico, Yersin.

[*Bacteria yersiniana* (Saussure, 1868)]

[In collection as *Dyme yersiniana* (Saussure)]

**zehntneri** Redtenbacher, 1908: 421 [*Bacteria*]

[♀. Guatemala (Mus. Genf); Vera Cruz (Coll. Godman).]

MHNG [?]: Not traced.

Type-material in BMNH.

[*Phanocles zehntneri* (Redtenbacher, 1908)]

**zehntneri** Carl, 1913: 53 [*Centema*]

[4 ♂. Simpar, in ins. Java. (Dr. L. Zehntner.). Muséum de Genève.]

MHNG [80]: 4 ♂.

ST: 4 ♂: Java, Zehntner.

[*Centrophasma zehntneri* (Carl, 1913)]

**zehntneri** Redtenbacher, 1908: 479 [*Parasipyoidea*]

[♀. Kandy, Ceylon (Mus. Genf).]

MHNG [?]: Not traced.

ST ♀ present in NHMW.

[*Parasipyoidea zehntneri* Redtenbacher, 1908]



*zomproi* Fritzsche & Gitsaga, 2000: 11-14, 2 figs [*Parapachymorpha*]

[Holotyp ♂: Thailand, Nakhon Ratchasima, S Khao Mai Pok, 900-100m, 101°19'E 14°31'N, 19.-25.X.1997, leg. I. Fritzsche (Coll. O. Zompro)]. Data for Paratypes, see Fritzsche & Gitsaga (2000).

MHNG [30]: 1 ♂, 1 ♀.

PT: 1 ♂, 1 ♀, Zucht O. Zompro I.1999; 349-64, 100 Coll. O. Zompro.

Further type-material in DEIC, ISNB, MCSN, NHMW, SMTD, ZMHB, ZMUH, ZSMC, Coll. I. Fritzsche, Coll. F. Hennemann, Coll. O. Zompro, affiliated with ZMUK.

[*Parapachymorpha zomproi* Fritzsche & Gitsaga, 2000]

## DESCRIPTIONS

*Alienobostra godmani* (Redtenbacher, 1908)

Figs 33-34

*Material examined.* 1 egg, ex ovipositor ST: 1 ♀, Costa Rica, Amer. cent., Mr. P. Biolley, 620/76 [MHNG, drawer 60]. In collection as *Bostra godmani* Redtenbacher.

*Description.* Capsule brown, with flat ridges of lighter colour. Micropylar plate positioned in the capsule in an angle, elongated cordiform in shape, marginated. Capitulum yellow brown, with lateral impressions, in the middle deeply impressed.

Measurements (mm): Total: 3.3; length: 2.8; width: 1.8; height: 1.4.

*Stheneboea palawanica* (Carl, 1913)

Figs 35-36

*Material examined.* 1 egg, ex ovipositor HT: Philippines, Palawan, 1898, Doherty, ex coll. Fruhstorfer [MHNG, drawer 39]. In collection as *Lonchodes palawanica* (Carl).

*Description.* Capsule brownish, depressed laterally, asymmetrical dorsoventrally, capsule covered with white and brown spots, swollen ventroposteriorly. Capitulum on a stalk, mushroom-shaped, orange brown. Capsule marginated anteriorly. Posterior end projecting. Micropylar plate strongly angled, whitish brown.

Measurements (mm): Total: 3.5; length: 3.0; width: 2.7; height: 1.8.

*Lonchodes dalawangsungay* Zompro sp. n.

Figs 43-44

*Material examined.* Holotype, ♀: Philippinen, Luzon, Imugan. [MHNG, drawer 39bis]. Left midleg broken off and missing, also left metatarsus. Fifth tarsomere missing in right metatarsus.

*Diagnosis.* Lonchodini. Differing from all species known by the two very large spines between the eyes and the ventroposterolateral lobes of abdominal segment VII.

*Description.* General colour midbrown. Body covered with lighter granulae, not shiny.

Head slightly narrowed posteriad, with indistinct median line. Eyes projecting hemispherically, with two prominent, acute horns between them, these directed anteriad. Vertex with several small tubercles, posterior margin with four short, longitudinal impressions. Gula present. Scapus rectangular, flat, ventrally impressed. Pedicellus cylindrical, two thirds as wide and slightly less than half as long as scapus. Antennae projecting beyond middle of abdominal segment II.

Prothorax with distinct anterior, lateral and posterior margins. With two tubercles anteromedially, and transverse impression medially. This impression also

with two tubercles submedially. Anterior half with two longitudinal impressions sublaterally. Mesonotum strongly elongated, about 7.5 times as long as pronotum, irregularly granulated, with fine, sometimes indistinct, median line, and some separated larger tubercles laterally. Segment slightly dilating near the coxae. Mesosternum granulated. Metathorax structured as mesothorax, but about one third shorter.

Profemora curved and compressed basally, triangular in cross-section, edges lamellate. Protibiae also triangular in cross-section, longer than profemora, edges also lamellate. Probasitarsus slightly longer than following three tarsomeres combined, with prominent crest in the anterior half. Second to fourth segment decreasing in length, also with dorsal crest. Fifth tarsomere curved, without dorsal crest, as long as third and fourth segment combined.

Meso- and metafemora trapezoidal in cross-section, with pointed edges and ventromedian carina. With a broad, single spine ventrolaterally before the knee. Meso- and metatibiae quadrate in cross-section. Mesotibiae shorter, metatibiae longer than their appertaining femora. In meso- and metatarsi basitarsi carinated, but without prominent crest in the anterior half. Following tarsomeres also with dorsal carina, decreasing in length. Fifth tarsomere curved, as long as previous two segments.

Median segment quadrate, with broad posterior margin, this margin lighter and less granulated, less than one fourth as long as metanotum.

Abdominal segment II slightly more than twice as long as median segment, as long as III and IV. V longest segment. VI as II. VII slightly shorter than II, with ventro-posterolateral lobes. Sternites II to VI with a very flat, black impression before posterior margin. VII in distal half depress laterally, carinated medially. VIII longer than IX and X combined, carinated dorsally. X with a v-shaped incision posteriorly. Supranal plate slightly projecting, triangular, with median carina. Subgenital plate with median keel in the posterior half, slightly broadened in the distal half, depressed ventrolaterally. Cerci short, acute, bristled.

Measurements (mm): Body: 124.5; head: 5.6; antennae: 67.5; pronotum: 3.9; mesonotum: 29.0; metanotum: 17.5; mediansegment: 3.9; profemora: 29.6; protibiae: 29.9; mesofemora: 23.0; mesotibiae: 21.7; metafemora: 26.8; metatibiae: 28.8; protarsi: 9.3; mesotarsi: 7.6; metatarsi: 7+.

Male unknown.

*Name.* "*dalawang sungay*", Tagalog for "two horns", refering to the two prominent spines between the eyes.

### *Lonchodes magayon* Zompro sp. n.

Figs 41-42, 56

*Material examined.* Holotype, ♂: Philipinen, Luzon, Mt. Banahao [MHNG, drawer 39bis]. Left foreleg, fifth tarsomere of left metatarsus and claws of right metatarsus broken off and missing.

*Diagnosis.* Lonchodini. The colouration of this species resembles strikingly *Periphetes granifer* (Westwood, 1859), but *magayon* n. sp. differs in the form of the genitalia. This colouration is unique in the whole Lonchodini.

*Description.* Whole body granulated, head, prothorax, posterior parts of thoracic segments, knees and tibiae green, abdomen greenish red, remaining parts of body orange brown.

Head elongated trapezoid, with a small, triangular impression between the eyes, vertex with several small tubercles. Clypeus light brown. Eyes brown, projecting hemispherically. Antennae projecting beyond abdominal tergite III. Scapus flattened rectangular. Pedicellus cylindrical, one third as long and two thirds as wide as scapus. Third antennomere considerably narrower and slightly longer than pedicellus.

Pronotum slightly shorter than head, green, with distinct anterior margin and deep median and transverse impression; slightly granulated. Mesonotum strongly granulated, brown, with green median line, broadened and green in the coxal area, epimera also green. Mesosternum strongly granulated. Metanotum structured as previous segment, one third shorter.

Profemora curved and compressed basally, four-edged, edges lamellate and bristled; with two green, lateral teeth anterolaterally, the exterior one prominent, the interior one indistinct. Probasitarsus as long as following tarsomeres combined, following segments decreasing in length, all tarsomeres carinated dorsally. Meso- and metafemora trapezoid in cross-section, edges distinct, but not lamellate, bearing very short, transparent bristles; ventroapically with large lateral spines.

Abdominal segments with fine, raised median line. Mediansegment quadrate, abdominal segment II 2.5 times as long. II to VI of similar length and width. VII 2/3 as long as VI, dilated posteriad, as long as IX. Lateral margins of IX parallel, median line deeply impressed in the posterior third. X 1.5 times as long as IX, posterolateral edges elongated triangular and projecting, these edges interiorly with long, black teeth. Cerci small, short, curved inwards, bristled. Subgenital plate comparably flat, slightly swollen.

Measurements (mm): Body: 72.0; head: 3.2; antennae: 52.4; pronotum: 2.2; mesonotum: 19.5; metanotum: 12.3; mediansegment: 2.2; profemora: 19.8; protibiae: 20.0; mesofemora: 16.4; mesotibiae: 16.6; metafemora: 18.5; metatibiae: 19.3; pro-tarsi: 7.9; mesotarsi: 5.6; metatarsi: 5.7+.

Female unknown.

*Name.* “magayon”, Bicolano, the language of the people inhabiting the collecting site, for “beautiful”, referring to the colouration.

***Lonchodes putingmantsa* Zompro sp. n.**

Figs 37-40, 54-55

*Material examined.* HT, ♂: Philippinen, Aroroy. [MHNG, drawer 39bis]. Right metatarsus and claw of left metatarsus broken off and missing.

PT: 1 ♀: Philippinen, Aroroy. [MHNG]. The abdomen is damaged by evisceration, the right antenna is broken off, but glued to the head. 1 ♂, Philippinen, Aroroy. [ZSMC].

*Diagnosis.* Lonchodini. Characterized by the white spots on genae, thorax and the male's terminal abdominal segments. These features distinguish *putingmantsa* distinctly from all other species in Lonchodini. Body strongly granulated.

*Description* ♂. Body brown, slightly shiny. Pro- and mesofemora green, their knees black. Metafemora brown, their knees also black. Tibiae greenish brown.

Head slightly longer than wide, narrowed distad. Eyes projecting hemispherically, between them with two flat, but acute tubercles. Colour of clypeus lighter. Genae white, with black margin dorsally. Tentorium also white. Antennae projecting beyond abdominal tergite III. Scapus flattened rectangular, two times as wide and three times

as long as pedicellus. Pedicellus cylindrical. Third antennomere half as wide and 1.5 times as long as pedicellus.

Pronotum with median and transverse impression, anterior margin broad, with two tubercles submedially. The white spots are positioned mediolaterally, also covering part of the epimera.

Prosternum white. Mesonotum strongly elongated and granulated, with fine, shiny median carina and widely separated small, transparent bristles (10x); dilating slightly before coxae, this area with white spots laterally, also covering epimera. Mesosternum structured as mesotergum, between coxae white spotted. Metathorax as mesothorax, but one third broader and one third shorter.

Profemora green, curved and compressed basally, four-edged, edges bristled; ventroapically with two submedian spines. Protibiae almost quadrate in cross-section, edges also bristled. First four tarsomeres with distinct dorsal carina. Basitarsus slightly longer than following four tarsomeres combined; second segment longer than third and fourth combined, third longer than fourth, fifth segment curved, slightly broadened apicad. Mesofemora and tibiae also green, trapezoid in cross-section. Mesofemora with two prominent, black lateral spines ventroapically. Metafemora and tibiae brown, structured as midlegs. Meso- and metatarsus as protarsus.

All abdominal segments with fine, median carina. Mediansegment slightly longer than wide, strongly granulated and with white spots laterally. Abdominal segments II to VII with a small (sometimes indistinct), white spot antero- and postero-laterally. II 2.5 times as long as median segment, II to VI of similar length, decreasing in width. VIII half as long as VII, dilating posteriad. Lateral margins of IX almost circular, whitish. X almost divided medially, white laterally, posterior ends strongly elongated and projecting, with striking black teeth interiorly. External vomer not produced, cerci strongly elongated, bristled. Sternite II with two white lateral spots anteromedially, III to VII with a small impression posteromedially.

Measurements ♂ (mm): Body: 96.2; head: 4.0; antennae: 64.8; pronotum: 2.8; mesonotum: 24.5; metanotum: 16.1; mediansegment: 3.2; profemora: 25.0; protibiae: 27.2; mesofemora: 18.5; mesotibiae: 19.0; metafemora: 21.9; metatibiae: 25.3; protarsi: 7.9; mesotarsi: 6.2; metatarsi: 6.7+.

*Description* ♀. More robust than ♂, without white spots, body and extremities uniformly midbrown.

Head from dorsal aspect oval in shape, between the hemispherically projecting eyes with two small, acute spines. Clypeus lighter brown. Antennae projecting distinctly beyond abdominal tergite II. Scapus strikingly flattened, rectangular, pedicellus cylindrical. Third antennomere half as wide and 1.5 times as long as pedicellus.

Pronotum slightly shorter and narrower than head, strongly granulated, with deep, blackish median and transverse impression and broad margin anteriorly. Mesonotum strongly elongated, with light median carina and irregular, small, dark spots and transparent bristles (10x), these are also present on the abdominal segments. Mesonotum with same structure, about 3/5 as long.

Profemora curved and compressed basally, four edged in corss-section, edges lamellate and bristled. Protibiae quadrate in cross-section, edges bristled. Probasitarsi carinated dorsally, as long as following four tarsomeres without claws combined,

following three segments decreasing in length, fifth tarsomere broadened apicad. Meso- and metafemora straight basally, trapezoid in cross-section, edges slightly lamellate and bristled. Tibiae as protibiae, meso- and metatarsi as protarsi. All knees black.

Abdominal segment II twice as long as median segment, II to VII of similar length, VIII about  $2/3$  as long as VII, slightly dilating posteriad, VIII as long as IX and X combined, X slightly longer than IX, posteriorly with a notch. Supra anal plate projecting, triangular. Sternites II to VII with small, black impression posteromedially. Subgenital plate boat-shaped, with an sharp keel ventromedially, acute posteriorly, projecting X by half of X's length. Cerci very short, small, elongated triangular.

Measurements ♀ (mm): Body: 124.1; head: 5.6; antennae: 71.0; pronotum: 5.0; mesonotum: 29.0; metanotum: 16.7; mediansegment: 4.3; profemora: 28.4; protibiae: 30.1; mesofemora: 20.9; mesotibiae: 18.8; metafemora: 22.2; metatibiae: 24.0; protarsi: 9.0; mesotarsi: 8.0; metatarsi: 8.8.

*Name.* “*puting mantsa*”, Tagalog for “white spotted”, refers to the characteristic white spots on the genae, thorax and the terminal abdominal segments of the male.

*Comment.* The white spots consist of a dust-like material. This kind of colouration was previously unknown in phasmids. The female paratype's abdomen is damaged by evisceration.

***Parapodacanthus* Brock gen. n.**

Figs 46-53

*Type-species:* *Parapodacanthus hasenpuschorum* Brock sp. n., by present designation.

*Diagnosis.* Typical Tropicoderini. Closely related to *Podacanthus* Gray, 1835, but easily distinguished by the presence of large spine-like tubercles on the mesonotum, in addition to differences in egg structure. Eggs are small in this new genus, oval with a small capitulum; capsule slightly hairy and not ridged. In *Podacanthus* Gray, eggs are large, oval or elongate with large capitulum; capsule not hairy, with numerous raised ridges.

*Description.* Medium sized, large winged Tropicoderini. Head slightly longer than wide. Eyes large. Three ocelli present. Antennae long, but shorter than length of fore leg. Scapus slightly broader than remaining segments.

Pronotum slightly longer than head, with central impression. Mesonotum short, just over 1.5 times the length of pronotum. The other spines slanting outwards, posterior pair shorter than preceding pairs. Metanotum slightly longer than mesonotum. Lateral margins of meso- and metathorax with series of small tubercles. Metathorax with small tubercles ventrally. Tegmina long and slender, slightly shorter in ♂ than in ♀, tapered to a round tip. Alae long with darker veins. Legs moderately long and slender, slightly hairy. Profemora smooth, except for apical spine. Meso- and metafemora with eight fairly even serrations ventrolaterally, and an apical spine. Tarsi of modest length.

Abdomen slender, in ♂ anal segment twice as long as abdominal segment IX, split into large lobes, broad on dorsal part, then considerably narrowed, ending in a club posteriorly. Lobes forming an expanded, circular arch-like structure. Subgenital

plate swollen, raised in centre, then tapered to slightly rounded tip, slightly projecting beyond posterior margin of sternite IX. In ♀, posterior margin of X bold triangular incised; supra-anal plate visible, rounded at tip. Operculum long and narrow, rounded at tip, extending beyond end X. Cerci much longer than X, broadened and leaf-like, slightly pointed at tip; overlapping or incurved.

*Distribution.* Australia, North Queensland.

*Species included.* *Parapodacanthus hasenpuschorum* Brock sp. n.

***Parapodacanthus hasenpuschorum* Brock sp. n.**

Figs 46-53, 60-62

*Material examined.* HT: ♂; Stone Creek, Garradunga, Innisfail, N. Qld., 19.I.1996, J. Hasenpusch [QMBA].

PT: 3 ♂, 10 ♀; Stone Creek, Garradunga, Innisfail, N. Qld. (2 ♂, 1 ♀, 16.I.1997, leg. P. Hasenpusch; 1 ♂, 2 ♀, 17.I.1997, leg. J. Hasenpusch; 1 ♀, 09.XI.1995, leg. P. Hasenpusch; 2 ♀, 20.XII.1995, leg. J. Hasenpusch; 1 ♀, 19.I.1996, leg. J. Hasenpusch; 1 ♀, 14.I.1997, leg. S. Hasenpusch; 1 ♀, 18.I.1997, leg. J. Hasenpusch; 1 ♀, 20.I.1997, leg. J. Hasenpusch) [QMBA]; 3 ♂, 3 ♀; North Queensland: Stone Creek, Garradunga, Innisfail, N. Qld. (1 ♂, with abdomen broken off, 1 ♀, XI.1992, leg. J. Hasenpusch; 1 ♂, 1 ♀, 29.X.1997, leg. J. Hasenpusch; 1 ♂, 1 ♀, and eggs, 25.X.1997, leg. J. Hasenpusch & P. D. Brock) [Coll. P. D. Brock]; 1 ♂, 3 ♀, Stone Creek, Garradunga, Innisfail, N. Qld. (1 ♂, 21.I.1997, leg. J. Hasenpusch; 2 ♀, 21.I.1997, leg. S. Hasenpusch; 1 ♀, 20.I.1997, leg. P. Hasenpusch) [ANIC]; 1 ♂; Cairns, "Nov. Holl" [MHNG].

**ADULTS**

Attractive leaf green and brown, medium sized insect of glossy appearance, with four pairs of large spine-like tubercles on mesonotum and dark pink alae.

*Description* ♂. Head slightly longer than wide. Genae green with a narrow dark brown band. Eyes large, brown. Three ocelli present. Antennae long, black with scapus and following segments dark brown.

Pronotum green, slightly longer than head, with central impression. Mesonotum more than 1.5 times as long as pronotum, with four pairs of large brown spine-like tubercles; the front pair are much longer, rather horn-like, black tipped, curved anteriad and laterad. The other spines slant outwards, the posterior pair shorter than the preceding pairs. Remainder of mesonotum green. Metanotum slightly longer than mesonotum; green. Lateral margins of meso- and metathorax with series of small tubercles. Metasternum with small tubercles. Tegmina long and slender, tapered to a rounded tip, green with broad cream margin followed by two thick central dark mauve lines, with a narrow white line between; then green area, which includes three cream stripes. Pre-anal part of alae the same colour, although margin is a narrower cream band, followed by two mauve lines and remainder green. Inner margin transparent / reddish. Alae dark pink with darker pink veins. Legs elongate, slightly hairy, fore legs yellowish brown, mid and hind legs, particularly femora dark reddish green; profemora smooth, except for apical spine. Meso- and metafemora with eight fairly evenly spaced serrations on ventrolateral carinae, and an apical spine. Tibiae smooth, except inner margin of metatibiae slightly serrate. Tarsi of modest length. Apices of leg segments darker.

Abdomen slender, abdominal segment VII reduced in size compared with previous segments, VIII shorter, broadened anteriorly; IX shorter again and narrow, slightly expanded at base. Anal segment twice as long as IX, split into two large lobes, broad

on upper part, then considerably narrowed, ending in a club at tip. The lobes form an expanded, circular arch-like structure. Subgenital plate swollen, raised in centre, then tapered to slightly rounded tip, just exceeding end of IX. Cerci much longer than X, broadened and leaf-shaped, slightly pointed at tip; overlapping.

Measurements (mm), HT, ♂: Body: 83.0; head: 3.5; antennae: 39.0; pronotum: 3.8; mesonotum: 6.5; metanotum: 9.0; tegmina: 16.0; alae: 58.0; median segment: 6.0; profemora: 20.0; protibiae: 17.0; mesofemora: 17.0; mesotibiae: 13.0; metafemora: 20.0; metatibiae: 18.0; protarsus: 11.0; mesotarsus: 7.0; metatarsus: 9.0; cerci: 6.0.

Measurements (mm), PT, ♂: Body: 83.0-88.0; head: 3.5-3.7; antennae: 39.0-40.0 (tips often broken off); pronotum: 3.8-4.0; mesonotum: 6.5-7.0; metanotum: 9.5; tegmina: 16.0-17.0; alae: 58.0-60.0; median segment: 5.5; profemora: 20.0-21.0; protibiae: 17.0-19.0; mesofemora: 16.0-17.0; mesotibiae: 12.0-13.0; metafemora: 20.0-21.0; metatibiae: 17.5-18.0; protarsus: 11.0; mesotarsus: 7.0; metatarsus: 9.0-10.0; cerci: 6.0-6.5.

*Description* ♀. Broader than male, but description similar except insect is nearly all leaf-green; tegmina and pre-anal part of alae are green, often with broad cream band of varying magnitude. The mesonotum is brown on the spine-shaped tubercles as in male, and there are brownish bands on the head. The legs are greenish, apices of femora and tibiae with slight brown tinge. Interolateral margin of metatibiae with 14 small serrations.

Metathorax with series of ten small tubercles laterally; much smaller series on metathorax. Metasternum with white margins and blotch on posterior part; tubercles also present.

Abdomen green, with middle part broad reddish brown. End of anal segment boldly triangularly incised, supra-anal plate visible, rounded at tip, which extends beyond end of anal segment. Cerci long, as long as IX and X combined; leaf-shaped, broader at base, incurved and slightly pointed at tip.

Measurements (mm), PT, ♀: Body: 100.0-117.0; head: 5.0-6.0; antennae: 42.0-50 (tips often broken off); pronotum: 4.7-5.5; mesonotum: 7.0-8.0; metanotum: 15.0-16.0; tegmina: 25.0-31.0; alae: 75.0-86.0; median segment: 7.0; profemora: 20.5-24.0; protibiae: 19.0-22.0; mesofemora: 16.0-22.0; mesotibiae: 12.0-14.0; metafemora: 21.0-27.0; metatibiae: 17.0-21.0; protarsus: 12.0-14.0; mesotarsus: 8.0-9.5; metatarsus: 9.0-10.5; cerci: 5.0-6.5.

## NYPHS

The first pair of spines on the mesonotum are black, followed by a central black longitudinal band, not reaching end of mesonotum. In the adult, this colouration changes and all spines are brown.

## EGG

Small, dark brown (orange when freshly laid), capsule oval, slightly hairy with small lighter brown knob-like capitulum on a stalk. Capsule with numerous small cristae. Micropylar plate small, cordiforme, its center dark brown to black, with lighter brown median line reaching posterior pole.

Measurements (mm): Capsule length: 2.7; width: 1.5; height: 1.5.

## NAME

Named *Parapodacanthus* in view of its apparant affinity with *Podacanthus* Gray. The species is named after the Hasenpusch family, who collected the majority of the type-series and have a passion for insects; few individuals can boast of such a beautiful range of insects in and around the vicinity of their rainforest home.

## DISTRIBUTION

Endemic for North Queensland, Australia. This species was only found at the lower slopes of Innisfail and Garradunga, Cairns, Kuranda, at Black Mt. Road and Mt. Lewis.

## COMMENTS

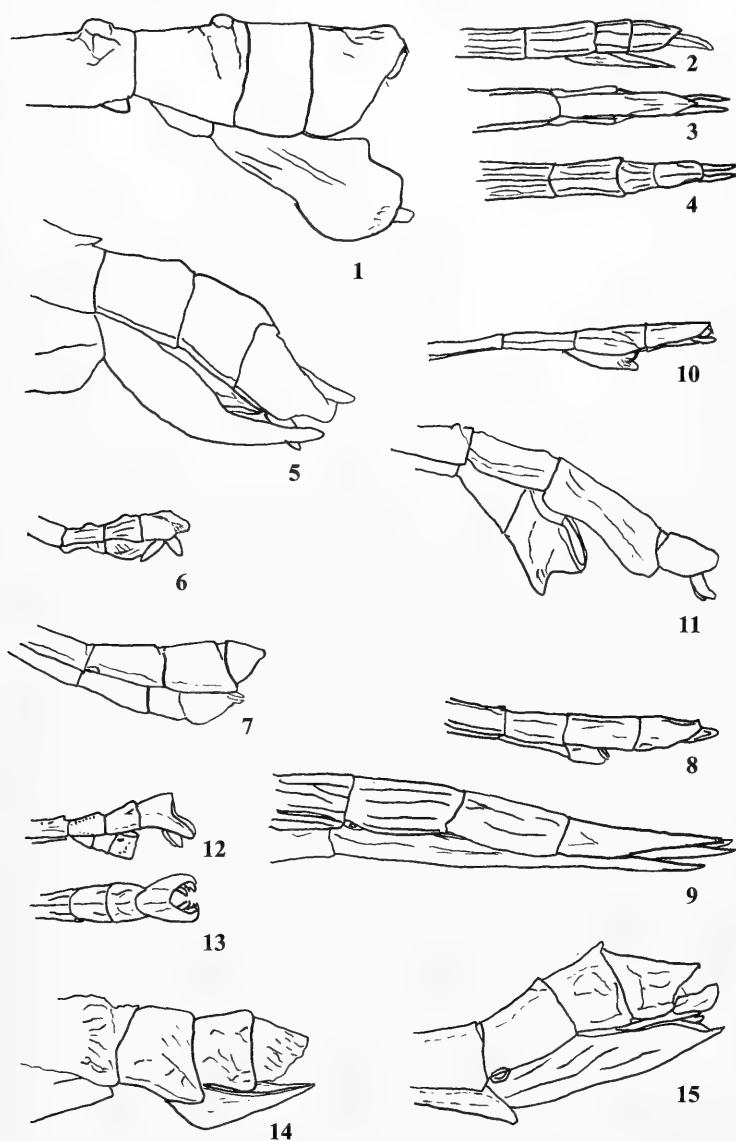
This rainforest species was found feeding on *Melicope elleryanas* (Rutaceae) and *Acronychia acidula* (Rutaceae) in the wild, whereas the closely related *Podacanthus* species feed on *Eucalyptus* spp. (Myrtaceae). *Parapodacanthus hasenpuschorum* sp. n. refuse to feed on various *Eucalyptus* spp. or *Tetradium daniellii* (Rutaceae). The male of an unidentified species in the collection of Mr T. Hiller (Mt. Glorious, South-East Queensland) was found on *Tetradium* sp. Both sexes can fly well. Adults and nymphs emit an unpleasant smelling odour from their prothoracic glands. Newly hatched nymphs are brick red with green leg joints.

## ACKNOWLEDGEMENTS

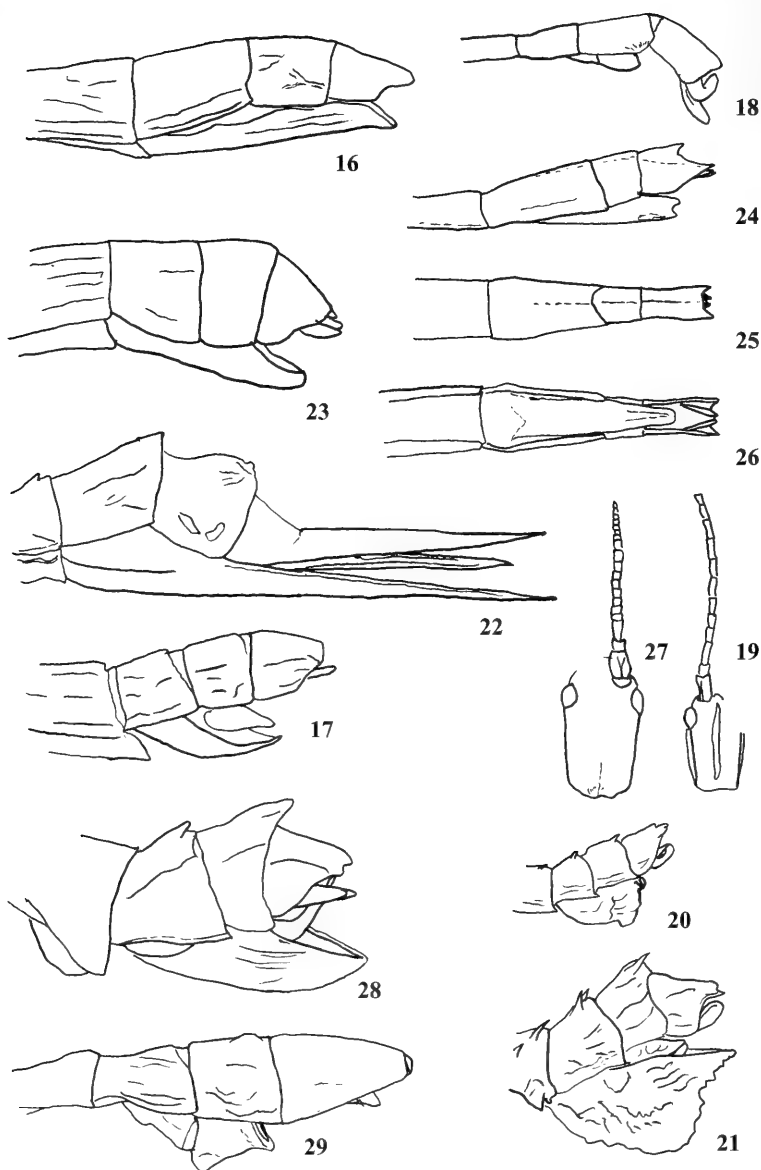
The authors wish to thank Prof. Dr V. Mahnert, Dr P. Schwendinger and Dr C. Lienhard [MHNG] for their support, and especially Ms A. Teschke (Berlin, Germany), who kindly arranged and digitalized the figures. Prof. Dr Victor P. Gapud and Orlando L. Eusebio (University of the Philippines, Los Baños, Philippines) supported naming the three species described from the Philippines. Dr P. E. Bragg (Nottinghamshire, England), Prof. Dr J. Adis and Prof. Dr W. Junk (both Max-Planck-Institute for Limnology, Ploen, Germany) provided their support in every respect.

J. Hasenpusch (Garradunga, North Queensland, Australia) kindly provided notes and foodplant details of *Parapodacanthus hasenpuschorum*.

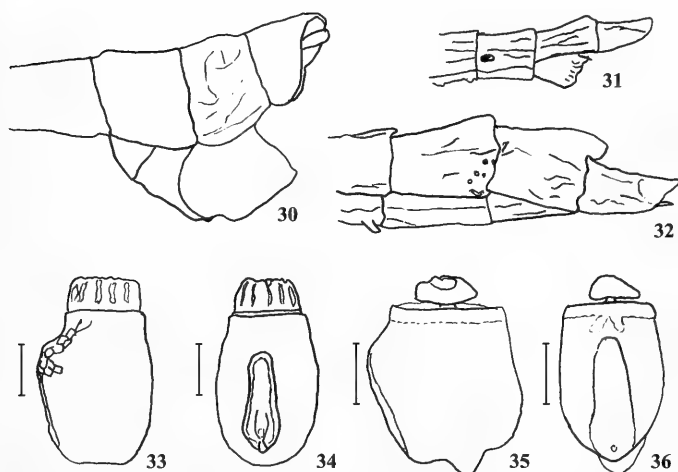




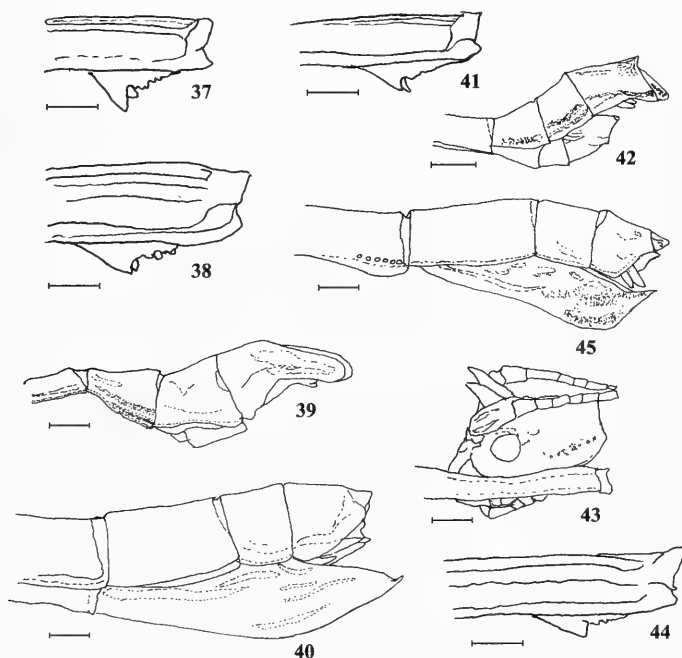
FIGS 1-15. Terminal abdominal segments, lateral aspect. To various scales. *Xylodus adumbratus* Saussure, 1859. 1. HT, ♀. *Gratidia carinulata* (Saussure, 1868). 2. ST, ♀. 3. Dorsal aspect. 4. Ventral aspect. *Paramenexenus ceylonicus* (Saussure, 1868) 5. HT, ♀. *Phantasca* (?) *cubensis* (Saussure, 1868). 6. HT, ♂. *Paroxyartes dohertyi* Carl, 1913. 7. HT, ♂. *Brachyrhamphus fecundus* Carl, 1915. 8. ST, ♂. 9. ST, ♀. *Clonistria guatemalensis* Redtenbacher, 1908. 10. LT, ♂. 11. PLT, ♂. *Micrarchus hystriculeus* (Westwood, 1859). 12. HT of *Micrarchus parvulus* Carl, 1913. ST, ♂. 13. ST, ♂. Dorsal aspect. *Paranisomorpha insignis* Redtenbacher, 1906. 14. ST, ♀. *Parastheneboea laetior* (Brunner v. Wattenwyl, 1907). 15. HT of *Echinoclonia borneensis* Carl, 1913, ♀.



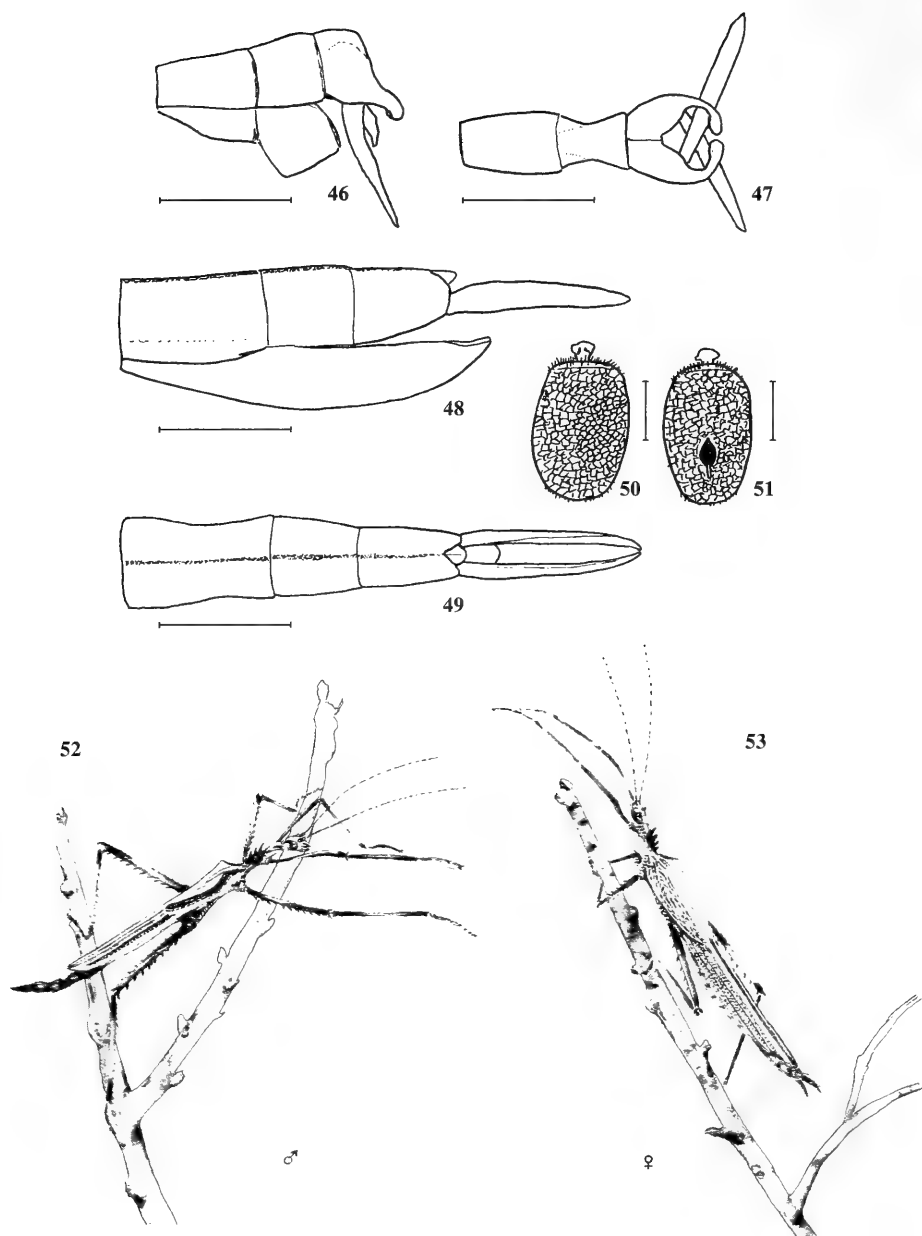
FIGS 16-29. Terminal abdominal segments, lateral aspect. To various scales. *Asceles malaccas* (Saussure, 1868). 16. HT, ♀. *Alloeophasma poeyi* (Saussure, 1868). 17. HT, ♀. *Gratidia pulchrepecta* Carl, 1913. 18. HT, ♂. 19. Head, dorsal aspect. *Cnipsus rhachis* (Saussure, 1868). 20. ST, ♂. 21. ST, ♀. *Labidiophasma rouxi* Carl, 1915. 22. ST, ♀. *Marmessoidea rubescens* (Saussure, 1868). 23. HT, ♀. *Paraleptinia schulthessi* (Carl, 1913). 24. HT, ♀. 25. Dorsal aspect. 26. Ventral aspect. 27. Head, dorsal aspect. *Andropromachus scutatus* Carl, 1913. 28. HT, ♀. *Pseudostheneboea segregata* Carl, 1913). 29. HT, ♂.



FIGS 30-36. Terminal abdominal segments, lateral aspect. To various scales. *Centrophasma spinosum* (Saussure, 1868). 30. HT, ♂. *Pachymorpha squalida* (Gray, 1833). 31. ♂. 32. ♀. Eggs. Scale: 1 mm. *Alienobostra godmani* (Redtenbacher, 1908), egg. 33. Lateral aspect. 34. Dorsal aspect. *Stheneboea palawanica* (Carl, 1913), egg. 35. Lateral aspect. 36. Dorsal aspect.

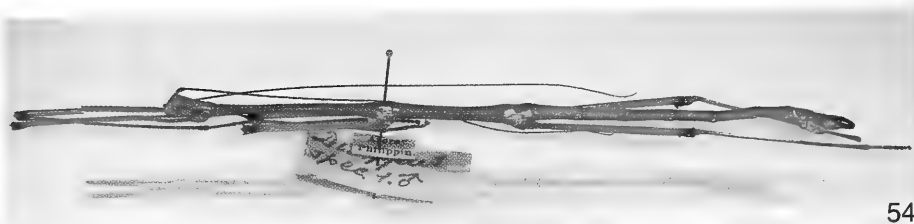


FIGS 37-45. *Lonchodes putingmantsa* Zompro sp. n. Right mesofemur, apex, lateral aspect. 37. HT, ♂. 38. PT, ♀. Terminal abdominal segments, lateral aspect. 39. HT, ♂. 40. PT, ♀. Scale: 5 mm. *Lonchodes magayon* Zompro sp. n., HT, ♂. 41. Right mesofemur, apex, lateral aspect. 42. Terminal abdominal segments, lateral aspect. Scale: 5 mm. *Lonchodes dalawangsungay* Zompro sp. n., HT, ♀. 43. Head, lateral aspect. Scale: 1 mm. 44. Left mesofemur, apex, lateral aspect. 45. Terminal abdominal segments, lateral aspect. Scale: 5 mm.



FIGS 46-53

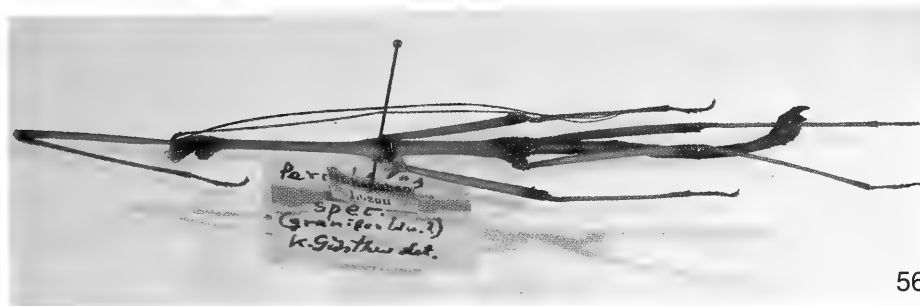
*Parapodacanthus hasenpuschorum* Brock gen. n., sp. n. Terminal abdominal segments. 46. ♂, lateral aspect. 47. ♂, dorsal aspect. 48. ♀, lateral aspect. 49. ♀, dorsal aspect. Scale: 5 mm. Egg. 50. Lateral aspect. 51. Dorsal aspect. 52. ♂. 53. ♀. Scale: 1 mm.



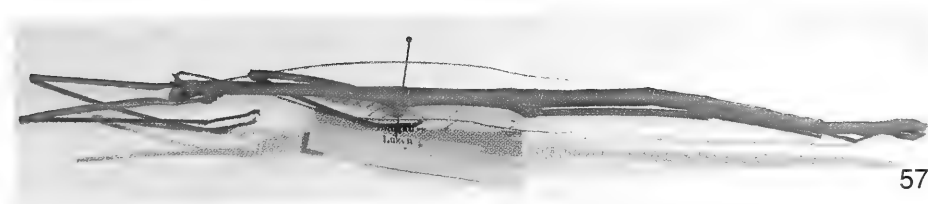
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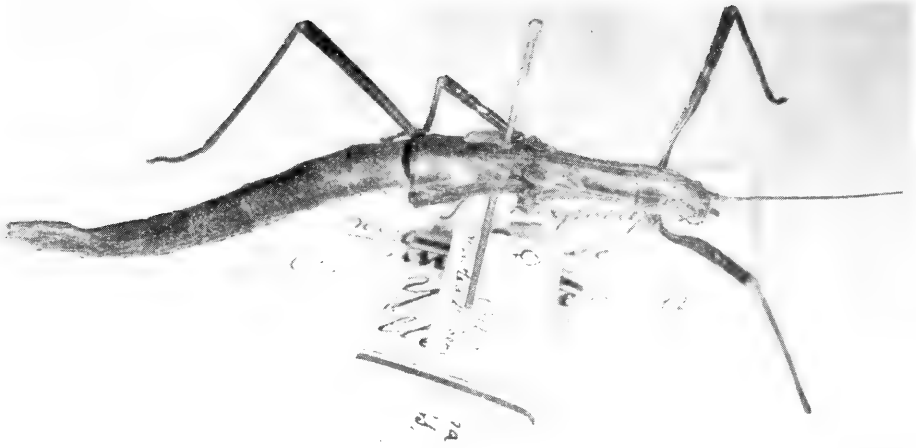
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Figs 54-57

*Holoderus putingmansa* Zompro sp. n. 54. HT, ♂. 55. PT, ♀. *Holoderus magayon* Zompro sp. n. 56. HT, ♂. *Holoderus dalawangsungay* Zompro sp. n. 57. HT, ♀.



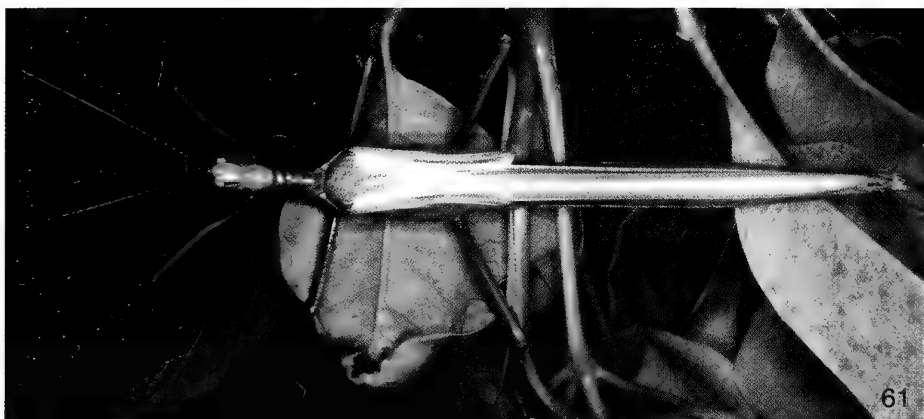
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FIGS 58-59

*Alloeophasma poeyi* (Saussure, 1868). 58. LT, ♀. 59. ♂, ST of *Phasma cubense* Saussure, 1868.



FIGS 60-62

*Parapodacanthus hasenpuschorum* Brock gen. n., sp. n. 60. ♂. 61. ♀. 62. Mating ♂ ♀.

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## Ground spiders (Gnaphosidae; Araneae) from Crete and adjacent areas of Greece. Taxonomy and distribution. III: *Zelotes* and allied genera

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**Ground spiders (Gnaphosidae; Araneae) from Crete and adjacent areas of Greece. Taxonomy and distribution. III: *Zelotes* and allied genera.** - The Gnaphosidae zelotine genera *Camillina*, *Drassyllus*, *Trachyzelotes*, *Setaphis* and *Zelotes* from Crete and the adjacent islands of Gavdos, Gavdopoula, Dia, Kos, Karpathos and Antikythira are investigated. Taxonomic details are presented for 20 species. Three species (*Drassyllus pumiloides* sp.n., *Zelotes daidalus* sp.n., and *Z. minous* sp. n.) are new to science. A new combination (*Camillina metellus* [from *Zelotes*]) and two new synonymies (*Trachyzelotes stubbsi* = *T. adriaticus*, *Zelotes bucharensis* = *Z. scrutatus*) are proposed. Two species (*Z. aerosus* and *Z. solstitialis*) are recorded for the first time in Europe, whilst four species are new records for Greece (*Drassyllus praeficus*, *Trachyzelotes adriaticus*, *Setaphis carmeli* and *Z. subterraneus*). Another two species are new records for Crete (*Z. labilis* and *Z. nilicola*).

**Key-words:** Araneae - Gnaphosidae - *Zelotes* - Greece - Crete - South Aegean - taxonomy - distribution.

## INTRODUCTION

*Zelotes* Gistel, 1848 is a highly speciose genus with worldwide distribution, included in the zelotine group of the Gnaphosidae. These genera possess a characteristic preening comb on metatarsi III and IV. The status of the genus *Zelotes* is problematic due to the vague limits of the taxonomical characters defining it, and to the great variety of genital characters among its species (Platnick & Shadab, 1983). Since there is no contemporary, comparative revision of *Zelotes* in the Old World, the study of this genus is very difficult, especially in the Mediterranean, where its diversity becomes very high.

Up to now, 357 *Zelotes* species have been identified in the whole world, of which, about 200 occur in the Old World (see Platnick, 2001). On a regional level,

species catalogues for Central Europe list 30 zelotine species (Grimm, 1985), for Czechoslovakia 19 (Buchar, 1992), for Romania 24 (Weiss & Petrisor, 1999), for Bulgaria 35 (Deltshev & Blagoev, 2001), and for Italy 57 (Pesarini, 1994). The recent revision by Levy (1998) revealed 36 species in Israel, making this group the most species-rich among gnaphosids and '...probably the largest of all indigenous spider genera'. These data are indicative of the high diversity of the genus in the Mediterranean region. It has also been observed in American *Zelotes*, that their species numbers are very high in California.

In Greece, as most records have been based on occasional hand collections, the number of species of these fast moving ground spiders has been greatly underestimated. Hadjissarantos (1940) recorded 10 zelotines out of 32 gnaphosids from Attiki. Research into the literature on Crete reveals 11 zelotines out of 34 Gnaphosidae.

In this study we present the results of an extensive survey along the island of Crete and the adjacent islands Gavdos, Gavdopoula and Dia, as well as additional material from the Aegean islands Kos, Karpathos and Antikythira and from mainland Peloponnisos. At all localities, pitfall traps have been used. This is the most suitable method for collecting these spiders, which are mostly nocturnal and very active on the ground (Levy, 1998). In total, 20 species have been identified. These belong to the genera *Camillina* [1 sp.], *Drassyllus* [2 spp.], *Trachyzelotes* [4 spp.], *Setaphis* [1 sp.] and *Zelotes* [12 spp.]. These data correspond to 9 of the previously recorded species (excluding *Z. clivicolus* and *Z. oblongus*, which probably are misidentifications of allied species). Consequently our results double the number of zelotines recorded for Crete. There are a few more species in our collection, which have not yet been satisfactorily identified, so we expect the actual number of zelotine species to be higher.

## MATERIAL AND METHODS

Sampling strategy, exact localities and habitat type of each site are given in Chatzaki *et al.* (2002a). In total, 59 sites were selected along the length of the island of Crete, 11 on the island group Gavdos – Gavdopoula and 3 on the island Dia (Fig. 1). Sampling sites cover Crete from north to south, west to east and along the altitudinal gradients of the three mountain massifs of the island, namely, Lefka Ori Mts., Psiloreitis Mt. and Lasithiotika Ori Mts. Most of the habitats selected on Crete are phrygana (plant communities which include dwarf, aromatic, thorny shrubs) and maquis. Few of the sites are pine forests or are situated close to permanent or temporary water reservoirs. Some records of material collected from other areas of mainland Greece and the Aegean islands (Fig. 2) have been added, but are not shown in the distribution maps given for the species.

Spiders were collected using pitfall traps (12 cm height, 9.5 cm in diameter). The killing preservative was ethylene glycole. At each site, 15-20 traps were set and changed in two-months intervals. In most cases only material from the period of high activity of Gnaphosidae, e.g., late spring to early autumn (Chatzaki *et al.*, 1998; Chatzaki, 1998), has been analyzed and is presented here.

The collection of material was financially supported by scientific projects of the EEC concerning biodiversity, i.e. TERRA, INTEREG II (ARCHIMED), or by the

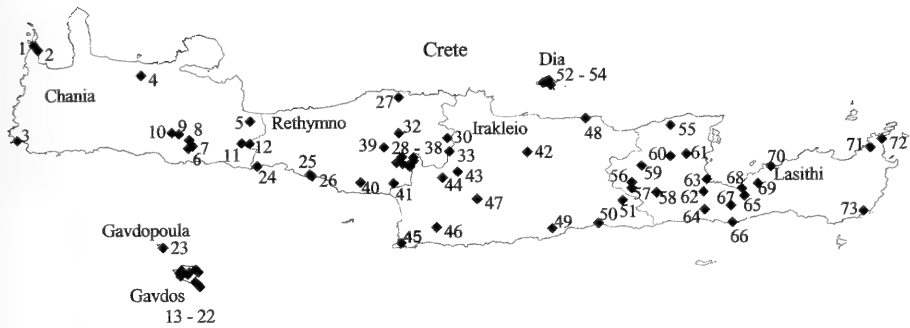


FIG. 1

Map of sampling sites on Crete and the surrounding islands Gavdos, Gavdopoula and Dia.



FIG. 2

Map of sampling sites on Attiki, Peloponnisos and Aegean islands.

Ministry of Environment, Physical Planning and Public Works (Project: "Gavdos, an island on the edge of Crete"), undertaken by the Natural History Museum of Crete (NHMC) and by the Biological Department of the University of Crete.

Identifications were carried out at the Natural History Museum of Crete (NHMC) and at the Zoological Institute of Innsbruck, Austria. Most of the material presented here is used for the Ph.D. thesis of the first author and, if not stated otherwise, it is deposited at the NHMC. Material from the collection of Dr Hadjissarantos,

deposited at the Zoological Museum of the Biological Department of Athens (ZMUA), and material from the collection of Roewer, deposited at the Senckenberg Museum of Natural History, Frankfurt am Main (SMF), as well as from the collection of the second author (CTh) and of Dr J. Levy (Hebrew University, Jerusalem, HUJ), has also been examined. Voucher specimens have been deposited at the Natural History Museum of Geneva (MHNG).

The following abbreviations are used in the text: TL: total length, PL: prosoma length, PW: prosoma width, OL: opisthosoma length, Cy: cymbium, Ta: tarsus, Me: metatarsus, Ti: tibia, Pa: patella, Fe: femur, d: dorsal, v: ventral, AME: anterior median eyes, ALE: anterior lateral eyes, PME: posterior median eyes, PLE: posterior lateral eyes. All measurements are given in mm. All drawings presented here are by the first author.

## RESULTS

*Camillina metellus* (Roewer, 1928) comb. n.

Figs 3-9, 115

*Zelotes metellus* Roewer, 1928 (p. 110, Fig. 15), CRETE: Rethymno, Aptera (type locality).

*Etymology.* As Roewer named this species after the Roman conqueror 'Metellus Creticus', the specific name is a noun in apposition, therefore invariable.

*Material.* *C. metellus*: CRETE: Georgioupoli, Phragmites stand at spring rivulet close to sandy seashore, E of the village (1 ♀, 19/5/2001, NHMC leg. & don. Kronestedt).

*C. metellus* (?): CRETE: CHANIA: Site 1 (a 6 ♂♂; b 3 ♂♂ 1 ♀); Site 2 (a 8 ♂♂ 3 ♀♀; b 6 ♂♂ 1 ♀); Site 4 (b 1 ♂) (leg. Lymberakis); Site 23 (c 2 ♀♀) (leg. Paragamian); RETHYMNO: Site 27 (a 16 ♂♂ 1 ♀) (leg. Chatzaki); Site 28 (a 1 ♂; b 1 ♂ 1 ♀); Site 29 (a 2 ♂♂); Site 39 (a 1 ♂); Site 41 (a 2 ♀♀; b 4 ♂♂ 1 ♀) (leg. Nikolakakis); IRAKLEIO: Site 46 (a 2 ♀♀; b 1 ♀) (leg. Papadimitrakis); Site 52 (b 4 ♂♂); Site 53 (b 1 ♂ (leg. Nikolakakis); LASITHI: Site 55 (a 1 ♂; b 2 ♂♂ [CTh]); Site 73 (a 2 ♂♂) (leg. Chatzaki); Site 68 (a 1 ♂) (leg. Papadimitrakis); Site 63 (b 5 ♂♂; b 1 ♂ 1 ♀ [MHNG]) (leg. Stathi).

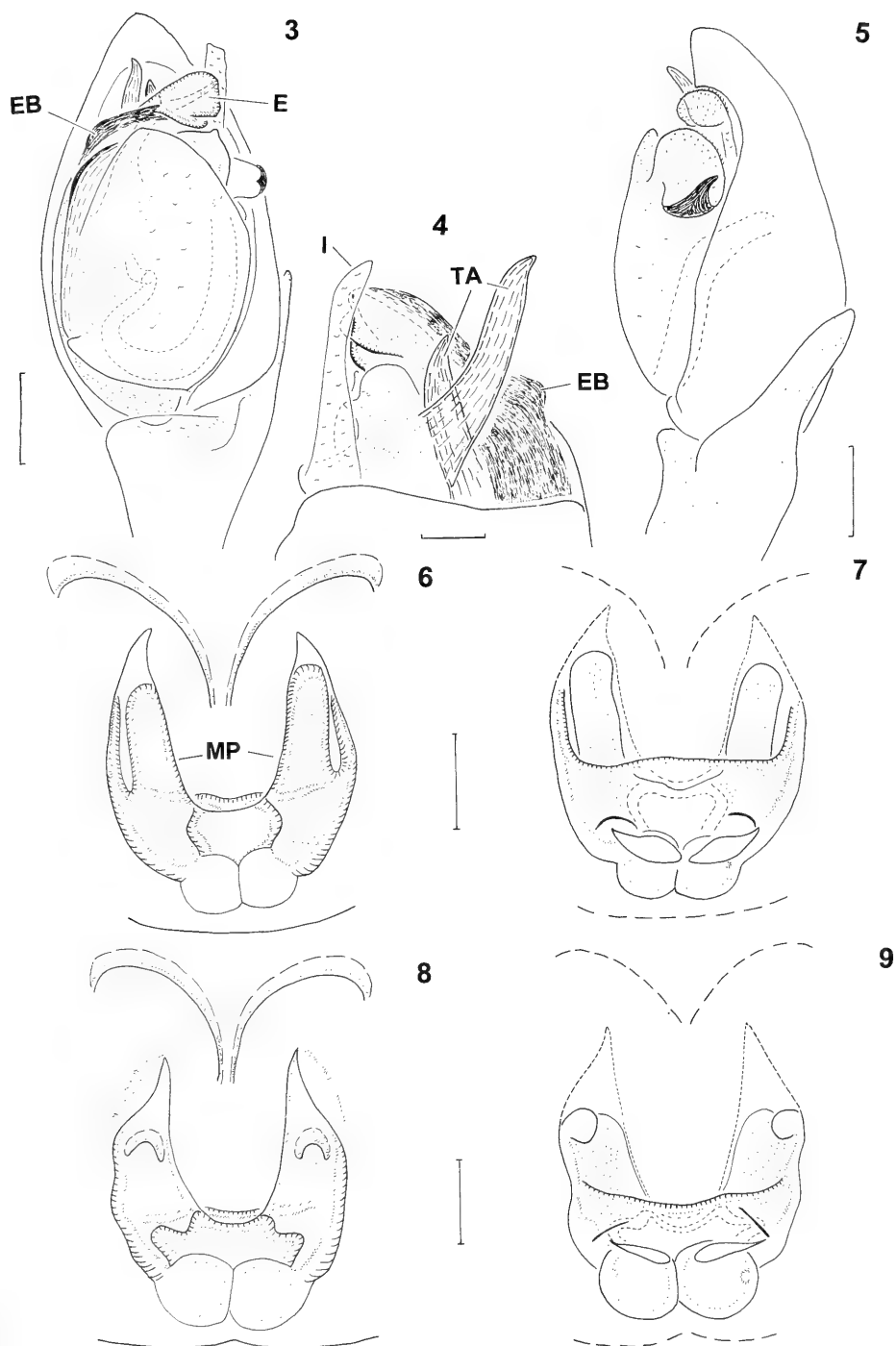
*C. metellus* (?): KARPATOS: Pyles – Volada, 1 km E, phrygana on an earlier burnt field, (1 ♂, pitfall traps 12/5/2001 – 23/8/2001, leg. Chatzaki).

Comparative material examined: *Zelotes metellus*: CRETE: 1 ♀ holotype, SMF: CR 612/62.

*Taxonomy.* *Zelotes metellus* was described by Roewer (1928) on the basis of a single female collected on Crete. Examination of the type verified the identification of a specimen, collected by Dr. Kronestedt in Georgioupoli (Fig. 8-9). In our collection there are females which are very similar to the type, but not identical (see Fig. 6-7). These females are matched with male specimens (Figs 3-5), both of them bearing the diagnostic characters of the genus *Camillina*: embolar base (EB) recessed, situated medially, terminal apophysis (TA) bifid, epigyne with median plate (MP) (sensu Platnick & Shadab, 1982a). On the basis of these characters we conclude that this species belongs to *Camillina*. Considering the similarity of the females of this species with the 'true' *Z. metellus*, we presume that the latter also belongs to the same genus, therefore the transfer is proposed. In the absence of male specimens, matching the

### FIGS 3-9

*Camillina metellus* (8-9), *C. metellus* (?) (3-5, 6-7). Palp of ♂, ventral view (3), dorsal view (4), retrolateral view (5), epigyne (6, 8), vulva (7, 9). EB: embolar base, E: embolus, l: lamella, TA: terminal apophysis, MP: median plate. Scale lines 0.1mm.



single 'true' *C. metellus* female, we dare not suggest that a second *Camillina* occurs on Crete. Therefore we reluctantly place all these specimens in one species, *C. metellus*.

*Camillina* was established by Tullgren (1910, sub *Camilla*) for a species from Tanzania. There are about 20 species known from the Old World (see Platnick & Murphy, 1987), mainly from Africa, and another 40 species from the New World (see Platnick & Shadab, 1982a). *C. europaea* Dalmat, 1922 is the only species of the genus recorded in Europe (southern Italy, Di Franco, 1997). This is the first record of the genus in Greece.

Measurements ♂ (♀), n = 8 (7): TL: 2.9-4.5 (3.5-4.5), PL: 1.4-1.9 (1.5-1.7), PW: 1.1-1.6 (1.1-1.5), OL: 1.5-2.4 (1.5-2.4), PL/PW: 1.14-1.41 (1.13-1.45).

♂ ♀: Small spiders with colour varying from yellow to light brown or grey. Ta and Me of contrasting light colour. Habitus as in *Zelotes*. AME very close to each other and to ALE, forming a continuous row, straight or slightly recurved. PME oval, closer to PLE than to each other, all set in a straight or slightly procurved line. Opisthosoma oval, anterior spinnerets cylindrical and well separated.

Legs: Ta and Me I-II with scopula hairs. Ta III-IV with stripes of dense, fine spines. Preening combs present on Me III and IV. Spination: Fe: I-II d 2-3; III-IV d 6-7. Pa: I-II, IV -; III r 1. Ti: I-II -; III-IV spinose. Me: I-II -; III-IV spinose.

♂ Pedipalp (Figs 3-5): Tibial apophysis long and tapering. Sperm duct following the tegulum from retro- to prolateral side, then turning inwards. Embolus (E) strongly developed, rising from the prolateral, dorsal part of the tegulum, transverse, distally broadened, its surface rough. Terminal apophysis (TA) bifid, with tips crossed (Fig. 4). A membranous lamella (l), originating from the dorsal part of the tegulum, also present. Retinaculum large, with anterior edge pointed.

♀ Epigyne (Fig. 6): Anterior margin divided, posteriorly prolonged. Median plate (MP) oval, longer than wide. Introductory orifices situated laterally and near the posterior rim of the median plate.

Vulva (Fig. 7): Introductory ducts short and sclerotized. Glandular heads situated anteriorly, often with a sclerotized ventral rim. Spermathecae globular and laterally connected to the introductory ducts. Fertilisation ducts situated at the anterior border of spermathecae.

*Ecology.* *C. metellus* has been mainly collected on phrygana near the Cretan coasts and inland, only on the southwestern slopes of Mt. Psiloreitis. The species reaches altitudes of about 1400m (Fig. 115).

*Distribution.* Crete, Karpathos (Greek endemic?).

### *Drassyllus praeficus* (L. Koch, 1866)

Figs 17-19, 116

*Identification:* Grimm (1985, p. 267, Figs 317, 319-320).

*Material.* CRETE: CHANIA: Site 4 (a 3 ♂♂); Site 5 (a 3 ♂♂ 3 ♀♀; b 1 ♀) (all leg. Lymberakis); Site 11 (b 2 ♂♂) (leg. Stathi); RETHYMNO: Site 24 (a 1 ♀) (leg. Stathi); Site 28 (a 7 ♀♀); Site 29 (a 2 ♂♂ 6 ♀♀); Site 29 (b 1 ♀); Site 32 (a 22 ♂♂ 49 ♀♀); Site 39 (a 5 ♂♂ 7 ♀♀); Site 40 (a 11 ♂♂; b 14 ♀♀) Site 41 (a 1 ♀) (all leg. Nikolakakis); Site 30 (a 1 ♀); Site 31 (a 1 ♀) (all leg. Trichas); Site 34 (a 10 ♂♂ 24 ♀♀; b 1 ♀; e 27 ♂♂ 3 ♀♀) (all leg. Chatzaki); IRAKLEIO: Site 42 (e 5 ♂♂ 1 ♀) (leg. Chatzaki); Site 43 (a 51 ♂♂ 84 ♀♀; b 18 ♀♀); Site 44 (a 9 ♂♂ 6 ♀♀); Site 47 (a 24 ♂♂ 11 ♀♀; b 10 ♀♀; e 6 ♂♂ 2 ♀♀) (all leg. Nikolakakis); Site 46 (a 1 ♀); Site 49 (a 9 ♂♂ 23 ♀♀; b 2 ♀♀); Site 51 (a 24 ♀♀) (all leg.



Papadimitrakis); Site 48 (a 3 ♂♂ 3 ♀♀) (leg. Trichas); LASITHI: Site 55 (b 1 ♀; e 2 ♂♂); Site 56 (a 8 ♂♂ 9 ♀♀; b 2 ♀♀; d 11 ♂♂) (all leg. Chatzaki); Site 58 (a 1 ♂ 22 ♀♀); Site 62 (a 1 ♀) (all leg. Papadimitrakis); Site 59 (c 1 ♂ 2 ♀♀ [MHNG]); Site 70 (a 1 ♂) (all leg. Trichas).

**Ecology.** *D. praeficus* is common on Crete, occurring from the coastal plains of the island up to 1650m. However, it is less common in the district of Chania and absent from the Lefka Ori Mts., whereas it is abundant on the other two mountains of Crete (Fig. 116). The peak of activity in both males and females is from spring to autumn.

**Distribution.** Europe to Central Asia (first record for Greece).

***Drassyllus pumiloides* Chatzaki sp. n.**

Figs 10, 12, 14-15, 116

**Etymology:** The name of this species indicates its close relationship to *D. pumilus* (C. L. Koch, 1839).

**Material.** Type material: Site 63a (Istro) (1 ♂ holotype [NHMC]; Site 58a (2 ♀♀ paratypes [NHMC]; 1 ♀ paratype [MHNG]).

CRETE: CHANIA: Site 1 (a 1 ♂); Site 2 (a 3 ♀♀); Site 6 (d 1 ♂); Site 7 (c 1 ♂) (all leg. Lymberakis); RETHYMNO: Site 28 (b 1 ♀); Site 29 (a 2 ♂♂ 2 ♀♀); Site 39 (a 1 ♀; b 1 ♂ [MHNG]); Site 40 (b 3 ♂♂ 2 ♀♀) (all leg. Nikolakakis); Site 34 (a 1 ♂ 1 ♀) (leg. Chatzaki); IRAKLEIO: Site 43 (a 3 ♂♂ 1 ♀; b 1 ♀); Site 45 (a 1 ♂); Site 47 (e 1 ♂ 1 ♀); Site 50 (b 1 ♀) (all leg. Nikolakakis); Site 49 (a 3 ♂♂; a 1 ♀ [CTh]; b 1 ♀) (all leg. Papadimitrakis); LASITHI: Site 55 (a 1 ♂) (leg. Chatzaki); Site 63 (a 1 ♂) (leg. Stathi); Site 58 (a 3 ♀♀) (leg. Papadimitrakis).

Comparative material examined: *D. pumilus* (C. L. Koch, 1839): Austria, N. Tirol, Ötztal (1 ♂, 5/5/1962, CTh); Italy, Trentino, V. Ledro, Bezzecca (1 ♀, 27/5/1963, CTh).

*D. jubatopalpis* Levy, 1998: Israel, Golan, Odem forest, 950m (1 ♂ 5/1997, leg. Sharon, HUJ 15222). Israel, same locality (1 ♀, 5/1996, leg. Sharon, Col. Levy, 15223).

**Taxonomy.** Measurements ♂ (♀), n = 6 (6): TL: 2.6-3.2 (2.6-3.4), CL: 1-1.2 (1.1-1.3), PW: 1.4-1.8 (0.8-0.9), OL: 1.4-1.8 (0.8-0.9), PL/PW: 1.2-1.37 (1.2-1.62).

♂♀: Small spiders of light to dark brown colour. Prosoma longer than wide. Eyes round, except for oval PME. AME closer to ALE than to each other. Posterior row of eyes recurved, anterior row procurved or straight.

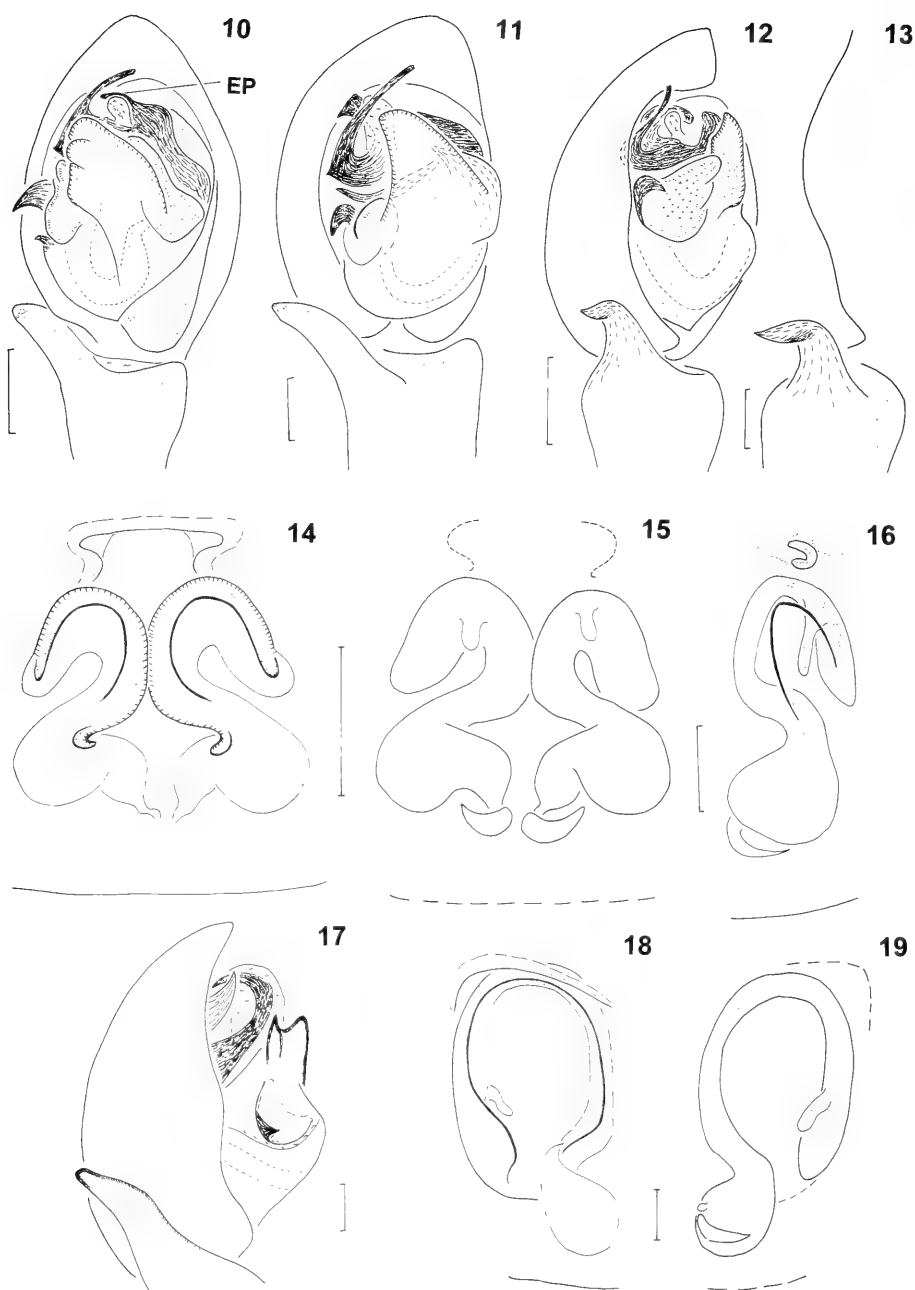
Legs: Co, Tr, Me and Ta yellow, the rest brown. Ta and Me I-II with stripes of scopula hairs, Ta and Me III-IV with dense spiny hairs. Me III-IV with apical preening comb. Spination: Fe: I-IV d 1-2. Pa: I-IV - . Ti: I-II - ; III-IV spinose. Me: I-II - ; III d 4; IV v 2 p 1.

♂ Pedipalp (Figs 10, 12): Tibial apophysis pointed, sharply bent dorsally. Embolus filiform, retrolateral embolar projection (EP) small. Terminal apophysis (TA) (sensu Platnick & Shadab, 1982b) prominent, rounded, almost covering the base of the embolus. Retinaculum retrolateral and very broad, with a very small projection proximal to it.

Epigyne (Fig. 14): Anterior margin continuous and almost touching the introductory ducts. Lateral margins forming loops alongside the introductory ducts.

Vulva (Fig. 15): Introductory ducts broad, curved, with small glandular heads on the anterior arch. Spermathecae two-lobed, with a large, globular chamber, and a smaller median chamber leading to the fertilisation ducts.

**Comments.** This species is very close to *D. pumilus* (C. L. Koch, 1839), as can be seen from Figs 11, 13 and 16 (see also Grimm 1985, p. 271, Figs 313, 323-324). Apart from different size, *D. pumilus* being much larger (♂♀ 3.5-4.8mm, according to



FIGS 10-19

*Drassyllus pumiloides* sp. n. (10, 12, 14-15), *Drassyllus pumilus* (11, 13, 16), *Drassyllus prae-ficus* (17-19). Palp of ♂, ventral view (10-11), retrolateral view (12-13, 17), epigyne (14, 16, 18), vulva (15, 19). EP: embolar projection. Scale lines 0.1mm.

Grimm), the new species also differs in the following characters: terminal apophysis less prominent; embolus longer; embolar projection broader; anterior margin of epigyne much closer to the introductory ducts; lateral margins almost parallel and straight, then turning sharply; introductory ducts more slender, with longer glandular heads; spermathecae pear-like. *D. villicoides* (Giltay, 1932) from Peloponnisos clearly differs in size (TL 7.5mm, according to Giltay, 1932). Females of *D. jubatopalpis* Levy, 1998 are also very similar, but different (in our specimens introductory ducts and median plate shorter, no ducts in the spermathecae, see Levy, 1998, p. 154, Figs 136-137), the males easily distinguishable by the shape of the tibial apophysis and by details of the palpal organ.

*Ecology.* *D. pumiloides* occurs almost all over Crete, being absent only from the easternmost areas, apparently avoiding the driest habitats (Fig. 116). It reaches altitudes up to 1650m.

*Distribution.* Crete (endemic?).

***Trachyzelotes barbatus* (L. Koch, 1866)**

Figs 20-21, 26-27, 117

*Identification:* Platnick & Murphy (1984, p.15 Figs 27-30).

*Material.* CRETE: CHANIA: Site 1 (a 15 ♂♂ 6 ♀♀; b 3 ♂♂ 3 ♀♀; c 1 ♀); Site 2 (a 29 ♂♂ 11 ♀♀; b 3 ♂♂ 4 ♀♀); Site 4 (a 6 ♂♂ 1 ♀; b 1 ♂ 5 ♀♀); Site 6 (d 1 ♀; e 2 ♂♂; f 1 ♀) (all leg. Lymberakis); RETHYMNO: Site 26 (a 1 ♀) (leg. Lymberakis).

ANTIKYTHIRA: Potamos, 700m W: sparse phrygana on sandy soil close to the village, (7 ♂♂ 4 ♀♀, pitfall traps 27/3/2001 – 5/8/2001, leg. Chatzaki).

*Ecology.* *T. barbatus* is not very common on Crete (Fig. 117). It has been found on sites at the western periphery of Crete and on Antikythira, always in phrygana.

*Distribution.* Mediterranean to Central Asia, USA. In our study area this species has been recorded only from western Crete and from Antikythira, suggesting an immigration from the Balkan peninsula.

***Trachyzelotes malkini* Platnick, 1984**

Figs 22-23, 28, 117

*Identification:* Platnick & Murphy (1984, p. 22, Figs 51-54).

*Material.* CRETE: CHANIA: Site 5 (a 7 ♂♂ 4 ♀♀); Site 6 (h 1 ♂; i 1 ♂) (all leg. Lymberakis); Site 13 (c 12 ♂♂ 3 ♀♀; d 3 ♂♂ 3 ♀♀ [MHNG]); Site 14 (c 3 ♂♂ 1 ♀; d 1 ♀); Site 15 (c 3 ♂♂; d 2 ♀♀); Site 16 (c 2 ♂♂); Site 20 (a 1 ♂); Site 21 (d 1 ♀) (all leg. Paragamian); RETHYMNO: Site 24 (a 1 ♂ 1 ♀) (leg. Stathi); Site 25 (a 2 ♂♂); Site 26 (a 4 ♂♂ 3 ♀♀; b 2 ♀♀) (all leg. Lymberakis); Site 27 (a 4 ♂♂ 2 ♀♀; f 5 ♂♂); Site 55 (b 2 ♂♂) (all leg. Chatzaki); Site 28 (a 4 ♂♂ 3 ♀♀; b 1 ♂); Site 29 (a 4 ♂♂ 1 ♀); Site 39 (a 8 ♂♂ 1 ♀; b 1 ♀); Site 40 (a 1 ♂ 1 ♀; b 27 ♂♂ 9 ♀♀; c 1 ♀); Site 41 (a 5 ♂♂ 2 ♀♀) (all leg. Nikolakakis); IRAKLEIO: Site 42 (e 1 ♂) (leg. Chatzaki); Site 43 (a 1 ♂ 1 ♀; b 1 ♀); Site 44 (a 3 ♂♂ 2 ♀♀; b 1 ♀); Site 45 (a 3 ♂♂ 3 ♀♀; b 2 ♀♀); Site 47 (a 1 ♂; b 2 ♂♂ 5 ♀♀; e 1 ♂); Site 50 (b 7 ♂♂ 1 ♀; c 1 ♀) (all leg. Nikolakakis); Site 46 (a 3 ♂♂ 7 ♀♀; b 2 ♂♂ 1 ♀); Site 49 (a 22 ♂♂ 7 ♀♀; b 8 ♀♀); Site 51 (a 2 ♀♀) (all leg. Papadimitrakis); LASITHI: Site 55 (a 6 ♂♂); Site 56 (a 3 ♂♂ 2 ♀♀; b 2 ♂♂ 1 ♀); Site 73 (e 4 ♂♂) (all leg. Chatzaki); Site 58 (a 8 ♂♂ 1 ♀); Site 64 (d 2 ♂♂ 1 ♀); Site 65 (a 2 ♂♂ 3 ♀♀) (all leg. Papadimitrakis); Site 63 (a 26 ♂♂ 2 ♀♀; b 6 ♀♀); Site 71 (a 2 ♂♂) (all leg. Stathi); Site 59 (a 4 ♀♀; c 10 ♂♂); Site 61 (b 1 ♂) (all leg. Trichas).

KARPATOS: Pyles – Volada, 1 km E, phrygana on an earlier burnt field, (1 ♂ 2 ♀♀, pitfall traps 12/5/2001 – 23/8/2001, leg. Chatzaki).

*Ecology.* This is the commonest *Trachyzelotes* species on Crete. It is widespread on the whole island, as well as on Gavdos and on Karpathos. It occurs in

phrygana, from the periphery of Crete into the mainland and up to 1450m. The peak of activity of males is in late spring to early summer and that of females in spring and summer.

**Distribution.** Russia, Turkey, GREECE: Crete: Chania: Kalathas, Akrotiri; Lasithi: Agios Nikolaos; Mallia (Platnick & Murphy, 1984: 23).

***Trachyzelotes lyonneti* (Audouin, 1826)**

Figs 24-25, 29, 117

**Identification:** Platnick & Murphy (1984, p. 6, Figs 7-10), Levy (1998, p. 105, Figs 19-22).

**Material.** CRETE: CHANIA: Site 1 (a 1 ♂); Site 4 (a 1 ♂; b 1 ♂) (all leg. Lymberakis); RETHYMNO: Site 27 (a 1 ♂) (leg. Chatzaki); Site 41 (a 1 ♀) (leg. Nikolakakis); IRAKLEIO: Site 47 (a 1 ♂; b 5 ♂♂ 3 ♀♀; e 2 ♀♀); Site 50 (b 23 ♂♂ 10 ♀♀) (leg. Nikolakakis); Site 50 (c 1 ♂ 4 ♀♀) (leg. Papadimitrakis); Site 48 (a 11 ♂♂ 4 ♀♀) (leg. Trichas); LASITHI: Site 55 (a 1 ♂) (leg. Chatzaki); Site 60 (a 2 ♂♂ 1 ♀) (leg. Stathi); Site 64 (c 3 ♂♂) (leg. Nikolakakis); Site 64 (d 12 ♂♂ 10 ♀♀; e 1 ♂) (all leg. Papadimitrakis); Site 61 (b 1 ♂); Site 66 (a 2 ♂♂) (all leg. Trichas).

**Ecology.** This species occurs in phrygana of the lowlands of Crete, below 600m (Fig. 117). It is absent from western Crete, which might be due to interaction with *T. adriaticus*, as will be pointed out later. Adults are found from spring to autumn.

**Distribution.** Mediterranean to Central Asia, USA, Brazil, Peru, GREECE: Crete: Irakleio, Gortyna (Platnick & Murphy, 1984: 23). *T. lyonneti* has a Mediterranean centre of distribution and was imported to USA, as commented by Platnick & Murphy (1984).

***Trachyzelotes adriaticus* (Caporiacco, 1953)**

Figs 30-31, 32-39, 117

***T. stubbsi*** Platnick & Murphy, 1984 (p. 9, Figs 15-16), Cyprus, Cape Kiti, near Larnaka airport (type locality). **Syn. n.**

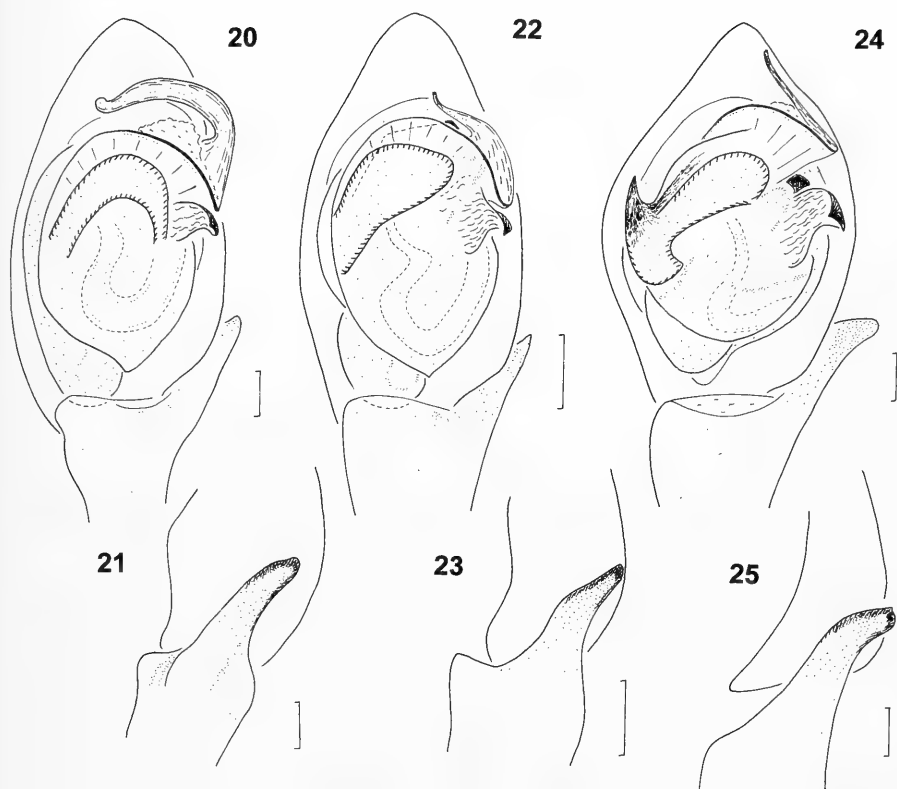
***T. stubbsi*:** Levy (1998, p. 106, Figs 23-24), Israel.

**Identification:** Platnick & Murphy (1984, p. 9, Figs 11-14), Levy (1998, sub *T. stubbsi*).

**Material.** CRETE: CHANIA: Site 1 (a 1 ♂); Site 2 (a 15 ♂♂ 5 ♀♀); Site 5 (a 2 ♂♂) (all leg. Lymberakis); Site 21 (b 1 ♀); Site 23 (a 2 ♀♀; c 8 ♂♂ 3 ♀♀) (all leg. Paragamian); RETHYMNO: Site 34 (a 3 ♀♀) (leg. Chatzaki); Site 25 (a 10 ♂♂ 1 ♀) (all leg. Lymberakis); Site 32 (a 2 ♂♂ 1 ♀) (leg. Nikolakakis).

ANTIKYTHIRA: Potamos, 700m W: sparse phrygana on sandy soil close to the village, (10 ♂♂ 3 ♀♀, pitfall traps 27/3/2001 – 5/8/2001, leg. Chatzaki).

**Taxonomy.** Males of this species have been collected from three islands: Crete, Gavdopoula and Antikythira. On all three islands, male specimens differ in size and in the prolateral extension of the terminal apophysis (sensu Platnick & Murphy, 1984). In males from Gavdopoula, which are the smallest, the tibial apophysis of some specimens is not bifid and is relatively more straight, whilst the extension of the terminal apophysis is rather small and has an extra angle below (Figs 34-35). Males from Antikythira are the largest. The tibial apophysis is almost the same as that of *T. adriaticus* from Crete, but the extension of the terminal apophysis has a characteristic hammer-like shape (Figs 36-37). Interestingly, these features fit the description of *T. stubbsi* Platnick & Murphy (1984, p. 9, Figs 15-16), known from a single male caught on Cyprus, and from a later record from Israel (Levy, 1998, p. 106, Figs 23-24). The female of *T. stubbsi* was unknown. All the female *Trachyzelotes* caught in the same



Figs 20-25

*Trachyzelotes barbatus* (20-21), *T. malkini* (22-23), *T. lyonnети* (24-25). Palp of ♂, ventral view (20, 22, 24), retrolateral view (21, 23, 25). Scale lines 0.1mm.

traps along with “*T. stubbsi*” males, are indistinguishable from those of *T. adriaticus* (see Figs 30-31). We suggest that the differences mentioned above are due to intra-specific variability, and therefore we place *T. stubbsi* in the synonymy of *T. adriaticus*.

**Ecology.** *T. adriaticus* has been found on few sites of western Crete and on Gavdos, where it occurs along with *T. malkini*. Apparently the distributions of *T. adriaticus* and *T. lyonnети* do not overlap on Crete (Fig. 117). We presume that there must be some kind of competition between these two species, especially when taking into consideration the dispersal capacities of these spiders.

**Distribution.** Italy, Balkans, China (first record for Greece).

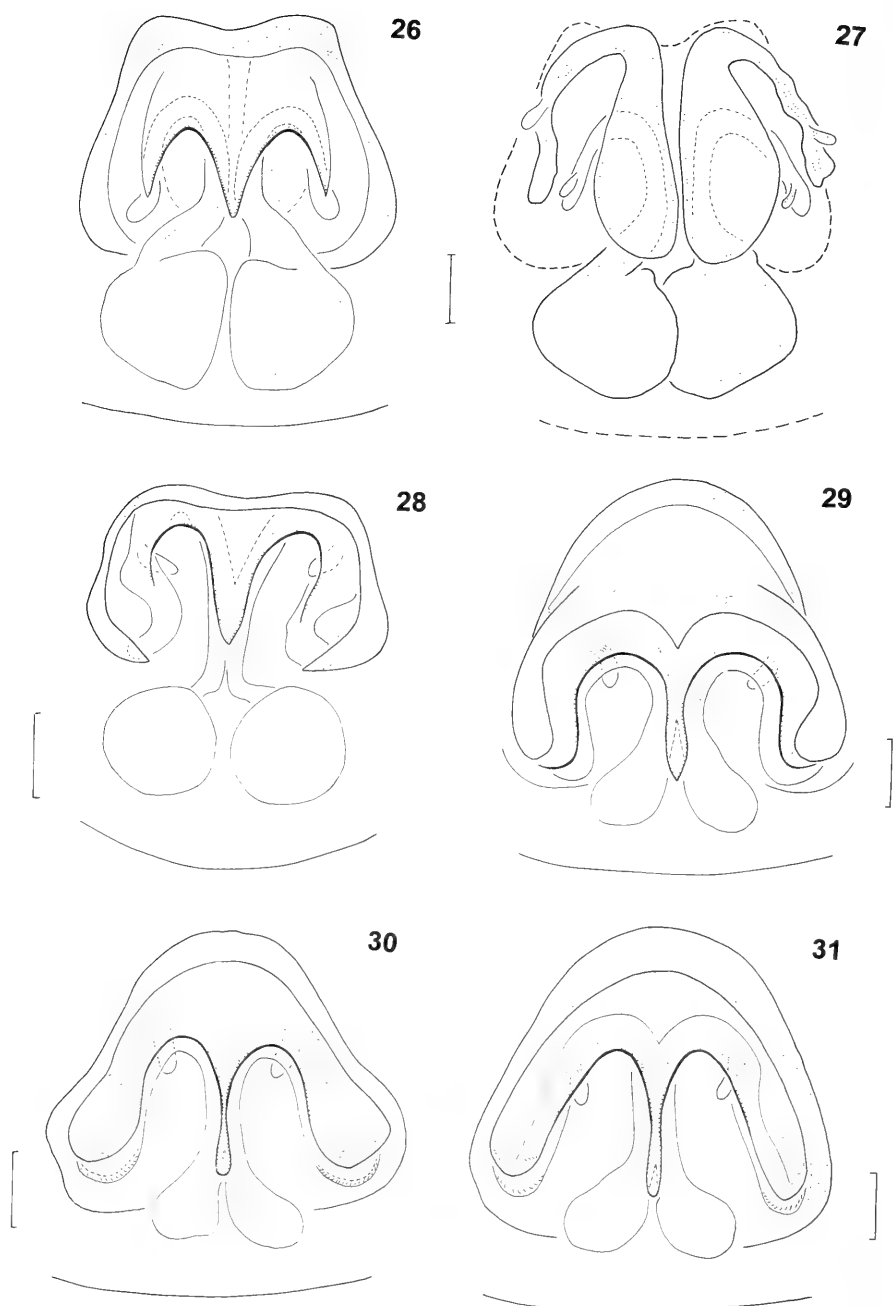
***Setaphis carmeli*** (O. P.-Cambridge, 1872)

Figs 40-41, 118

**Identification:** Levy (1998, p. 96, Figs 2-5), Platnick and Murphy (1996, p. 6, Figs 5-8).

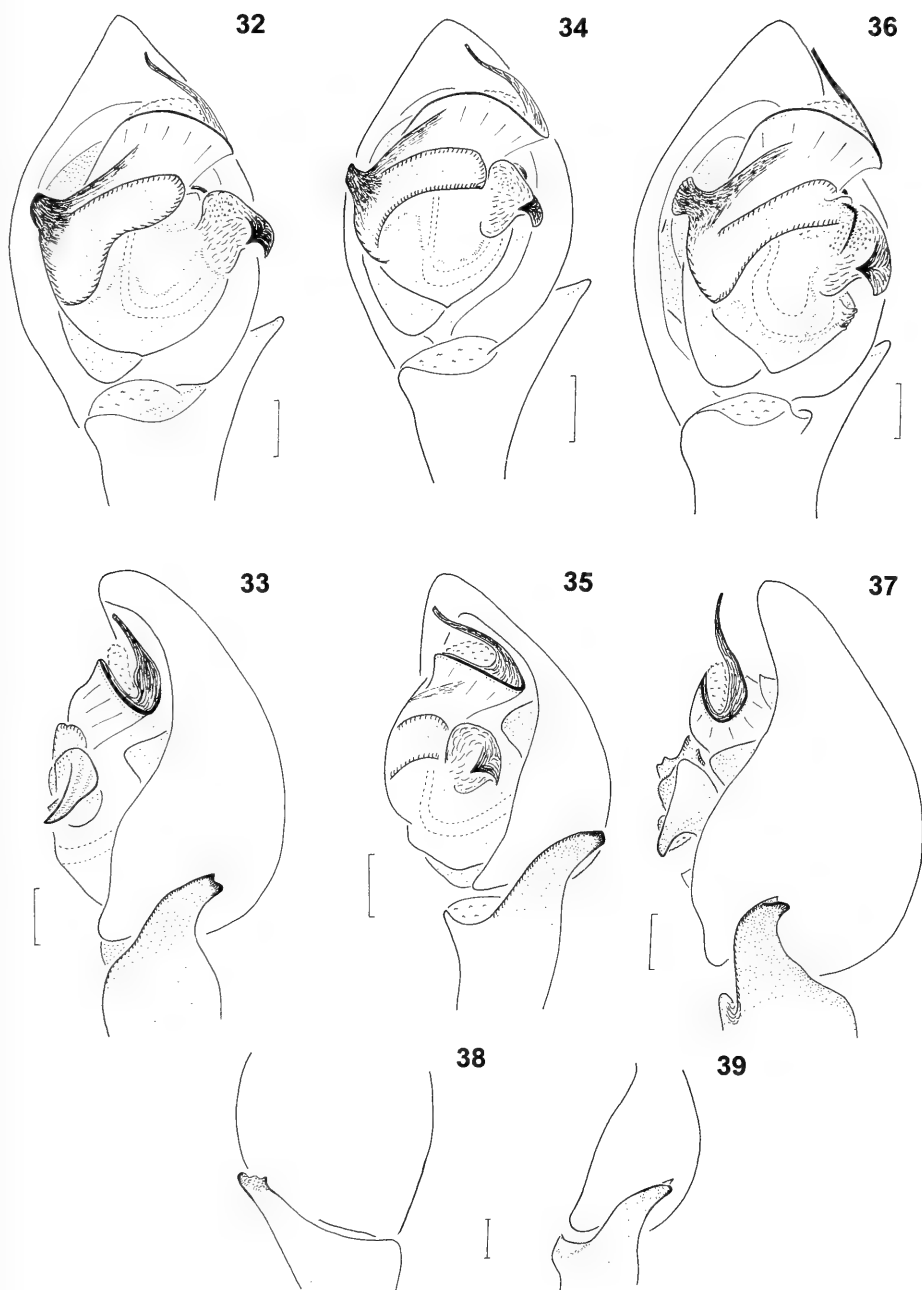
**Material.** CRETE: CHANIA: Site 6 (c 2 ♂♂) (leg. Lymberakis); RETHYMNO: Site 25 (a 3 ♂♂) (leg. Lymberakis); IRAKLEIO: Site 44 (a 1 ♂); Site 47 (a 1 ♂) (all leg. Nikolakakis); LASITHI: Site 63 (a 1 ♂) (leg. Stathi).

Comparative material examined: *S. carmeli*: Israel, Golan heights, Odem forest (1 ♂, 5/1997, leg. Sharon, HUI 15221).



Figs 26-31

*Trachyzelotes barbatus* (26-27), *T. malkini* (28), *T. lyonnети* (29), *T. adriaticus* (30-31). Epigyne (26, 28-29, 30), vulva (27, 31). Scale lines 0.1mm.



FIGS 32-39

*Trachyzelotes adriaticus*. Specimens from Crete (32-33, 38-39), Gavdopoula (34-35) and Antikythira (36-37). Palp of ♂, ventral view (32, 34, 36), retrolateral view (33, 35, 37, 39), tibial apophysis, dorsal view (38). Scale lines 0.1mm.

**Taxonomy.** The characters of our specimens fit the descriptions and drawings by both Levy (1998) and Platnick & Murphy (1996). In our specimens, the embolus is long, forming two coils (Fig. 40). The examination of a male from Israel verified the identity of our specimens. Females have not yet been captured on Crete.

**Ecology.** *S. carmeli* was found only in the lowlands of Crete and is not very common (Fig. 118).

**Distribution.** Mediterranean (first record for Greece).

### ***Zelotes aerosus* Charitonov, 1946**

Figs 42-43, 118

**Identification:** Charitonov (1946, p. 26, Fig. 41).

**Material.** CRETE: CHANIA: Site 2 (a 1 ♂) (leg. Lymberakis).

**Taxonomy.** This species was described by Charitonov (1946) from Uzbekistan and has not been recorded in the literature ever since. Although the type was not available to us, we feel sure that our specimen belongs to *Z. aerosus*, because of the shape of the tibial apophysis and the characteristic embolus, transversing the tegulum in its middle. Only one male prosoma was found in our collection.

♂ Pedipalp (Figs 42-43): Tibial apophysis long, with tapering end. Embolus starting at anterior part of tegulum with a broad base, then abruptly narrowed, filiform, forming a loop at the retrolateral side of the tegulum. Apical part of the tegulum with a conductor-like apophysis (A), composed of a tapering sclerotized process and a membrane.

**Comments.** Two distinct characters of the palpal organ, i.e. the embolar base and the tegular process, as well as the shape of the female epigyne (see Charitonov 1946, Fig. 42), separate *Z. aerosus* from other zelotines. Its generic placement should be re-evaluated when more material is available.

**Ecology.** *Z. aerosus* has been collected only at one locality, in phrygana close to the sea (Site 2).

**Distribution.** Uzbekistan, Crete (first record for Europe).

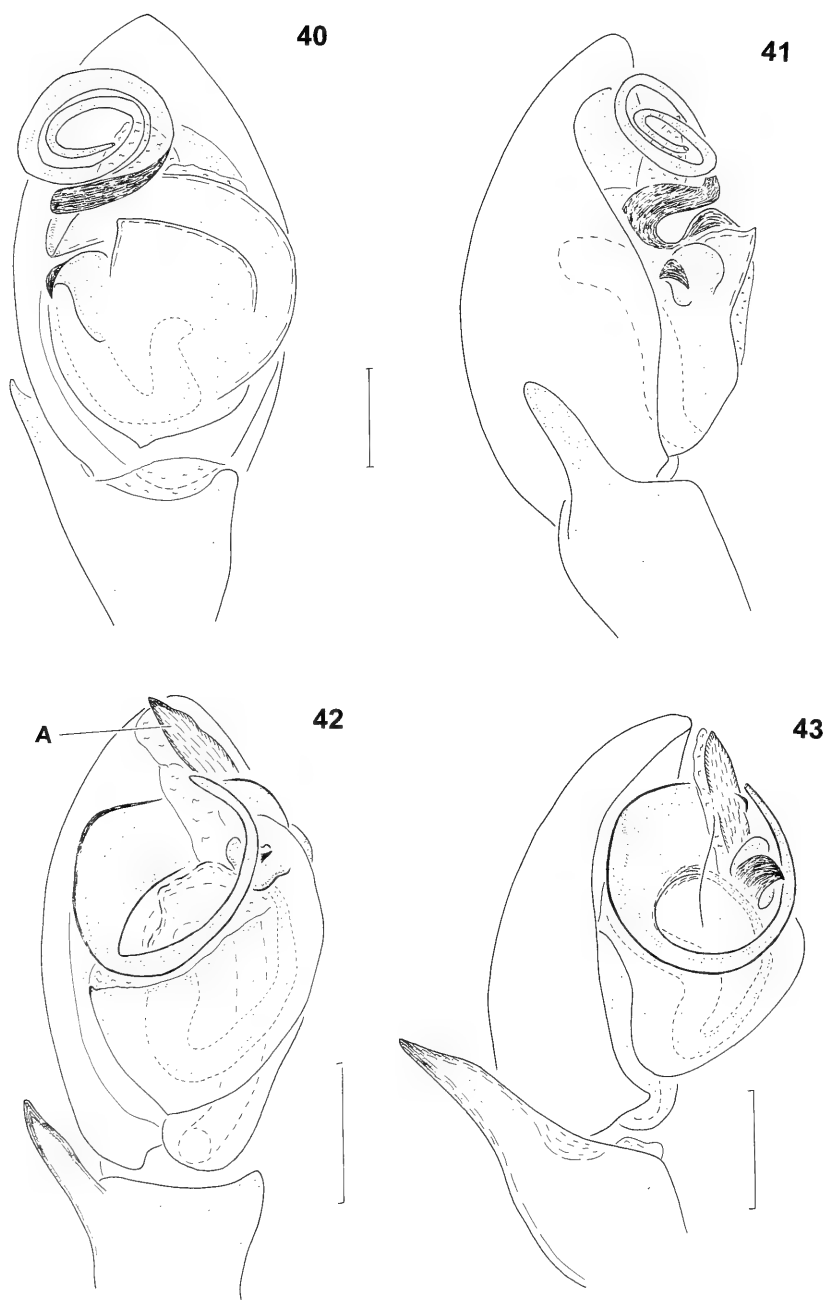
### ***Zelotes caucasius* (L. Koch, 1866)**

Figs 44-45, 48-49, 119

**Identification:** Levy (1998, p. 137, Figs 92-96), Grimm (1985, p. 281, Figs 231, 234-235).

**Material.** CRETE: CHANIA: Site 1 (a 14 ♂♂ 8 ♀♀; b 2 ♂♂ 14 ♀♀; c 1 ♂ 2 ♀♀); Site 2 (a 14 ♂♂ 5 ♀♀; b 18 ♂♂ 23 ♀♀); Site 3 (a 10 ♂♂ 6 ♀♀; b 5 ♀♀); Site 4 (a 2 ♀♀; b 2 ♂♂ 1 ♀; c 1 ♀); Site 5 (a 3 ♂♂ 1 ♀; b 4 ♀♀); Site 6 (f 1 ♀; g 1 ♀); Site 7 (e 1 ♂; f 4 ♀♀; g 3 ♀♀); Site 8 (f 8 ♂♂ 5 ♀♀; g 4 ♀♀; h 1 ♀) (all leg. Lymberakis); Site 13 (a 2 ♂♂ 16 ♀♀); Site 13 (c 10 ♂♂ 6 ♀♀; d 12 ♂♂ 19 ♀♀); Site 14 (a 3 ♂♂ 11 ♀♀; b 3 ♀♀; c 27 ♂♂ 14 ♀♀; d 19 ♂♂ 44 ♀♀); Site 15 (c 5 ♂♂ 5 ♀♀ [MHNG]; d 2 ♂♂ 5 ♀♀); Site 16 (a 1 ♂ 5 ♀♀; c 5 ♂♂ 8 ♀♀; d 6 ♂♂ 1 ♀); Site 17 (c 1 ♂); Site 18 (a 9 ♀♀; c 2 ♂♂ 7 ♀♀; d 24 ♂♂ 11 ♀♀); Site 19 (c 2 ♂♂ 1 ♀; d 1 ♂ 2 ♀♀); Site 20 (a 2 ♂♂; b 4 ♂♂ 7 ♀♀); Site 22 (a 1 ♂ 1 ♀; b 2 ♂♂); Site 23 (a 1 ♂; c 22 ♂♂ 19 ♀♀) (all leg. Paragamian); RETHYMNO: Site 35 (a 1 ♀); Site 36 (a 19 ♂♂ 7 ♀♀) (all leg. Trichas); Site 27 (a 9 ♂♂ 4 ♀♀); Site 34 (a 3 ♂♂ 1 ♀; b 2 ♀♀); Site 37 (a 15 ♂♂ 10 ♀♀; b 9 ♀♀; c 3 ♀♀; e 6 ♂♂); Site 55 (b 9 ♂♂ 42 ♀♀) (all leg. Chatzaki); Site 25 (a 23 ♂♂ 8 ♀♀; b 5 ♂♂ 4 ♀♀; Site 26 (b 1 ♀) (all leg. Lymberakis); Site 28 (a 5 ♂♂ 1 ♀; b 9 ♂♂ 15 ♀♀); Site 29 (b 1 ♂ 1 ♀); Site 32 (a 14 ♂♂ 10 ♀♀; b 15 ♀♀); Site 39 (a 2 ♂♂; b 6 ♂♂ 21 ♀♀); Site 40 (b 29 ♂♂ 17 ♀♀; c 20 ♂♂ 22 ♀♀); Site 41 (a 43 ♂♂ 22 ♀♀; b 4 ♂♂ 57 ♀♀) (all leg. Nikolakakis); IRAKLEIO: Site 43 (a 4 ♂♂ 2 ♀♀; b 12 ♂♂ 26 ♀♀; c 6 ♀♀); Site 44 (a 5 ♂♂; b 8 ♂♂ 9 ♀♀; c 4 ♀♀); Site 45 (a 4 ♂♂ 9 ♀♀; b 5





FIGS 40-43

*Setaphis carmeli* (40-41), *Zelotes aerosus* (42-43). Palp of ♂, ventral view (40, 42), retrolateral view (41, 43). A: conductor-like apophysis. Scale lines 0.1mm.

♀ ♀); Site 47 (b 12 ♂♂ 13 ♀♀; c 1 ♀); Site 52 (b 6 ♂♂ 7 ♀♀); Site 53 (b 5 ♂♂ 3 ♀♀) (all leg. Nikolakakis); Site 46 (a 21 ♂♂ 38 ♀♀; b 17 ♀♀); Site 49 (a 6 ♂♂; b 11 ♂♂ 7 ♀♀; c 1 ♀); Site 51 (a 4 ♂♂ 2 ♀♀; b 1 ♀) (all leg. Papadimitrakis); Site 48 (a 2 ♀♀) (leg. Trichas); LASITHI: Site 27 (b 2 ♂♂); Site 55 (a 7 ♂♂ 4 ♀♀ [CTH]); Site 56 (a 5 ♂♂ 2 ♀♀); Site 57 (a 59 ♂♂ 62 ♀♀; b 4 ♀♀); Site 73 (a 8 ♂♂ 27 ♀♀; b 2 ♂♂ 1 ♀; e 1 ♂) (all leg. Chatzaki); Site 58 (a 4 ♂♂ 13 ♀♀; b 2 ♀♀); Site 62 (a 2 ♀♀); Site 64 (d 3 ♂♂ 4 ♀♀); Site 65 (a 1 ♂ 3 ♀♀); Site 68 (a 2 ♀♀) (all leg. Papadimitrakis); Site 63 (a 1 ♂; b 1 ♂ 4 ♀♀); Site 71 (a 6 ♂♂ 1 ♀; b 51 ♂♂ 41 ♀♀; c 7 ♀♀) (all leg. Stathi); Site 61 (a 1 ♂); Site 70 (b 1 ♂); Site 72 (a 1 ♀) (all leg. Trichas).

KOS: Kefalos – Ag. Ioannis, 1 km S, phrygana and adjacent pine forest, (1 ♂ 5 ♀♀, pitfall traps 26/6/2001 – 9/9/2001, leg. Chatzaki).

KARPATOS: Pyles – Volada, 1 km E, phrygana on an earlier burnt field, (1 ♂ 3 ♀♀, pitfall traps 12/5/2001 – 23/8/2001, leg. Chatzaki).

ANTIKYTHIRA: Potamos, 700m W: sparse phrygana on sandy soil close to the village, (38 ♂♂ 34 ♀♀, pitfall traps 27/3/2001 – 5/8/2001, leg. Chatzaki).

**Taxonomy.** *Z. caucasius* is a well-defined species, occurring in the whole Mediterranean region, its range extending to Central Europe, with northernmost localities in Slovakia and eastern Austria. Males are characterised by a prolateral tegular apophysis (TA) and a very long, curved embolus with a broad embolar base which forms a pointed retrolateral tip. In our specimens the tegular apophysis is lying close to the tegulum, whereas in the drawings of Levy (1998, Figs 92-93) it is directed to one side. The epigyne of females is characterised by an entire, transverse anterior margin, followed by a posterior one, leading into a large atrium. The introductory channels are situated between two large pouches, a smaller ventral pouch and a larger dorsal one, which underly almost the entire surface of the epigyne. As stated by Levy (1998), these characters clearly separate *Z. caucasius* from all other *Zelotes*.

**Ecology.** This species has been captured very frequently in pitfall traps, as was also the case in Israel (Levy, 1998). It is very common on Crete, having been collected from most of the sites investigated (Fig. 119) and in great numbers. It is also present on all south Aegean islands investigated in this study. Adults occur during the whole year, with a peak of activity of females in mid-summer and of males in late spring and in early autumn.

**Distribution.** Europe to Central Asia.

### *Zelotes solstitialis* Levy, 1998

Figs 46-47, 50-51, 118

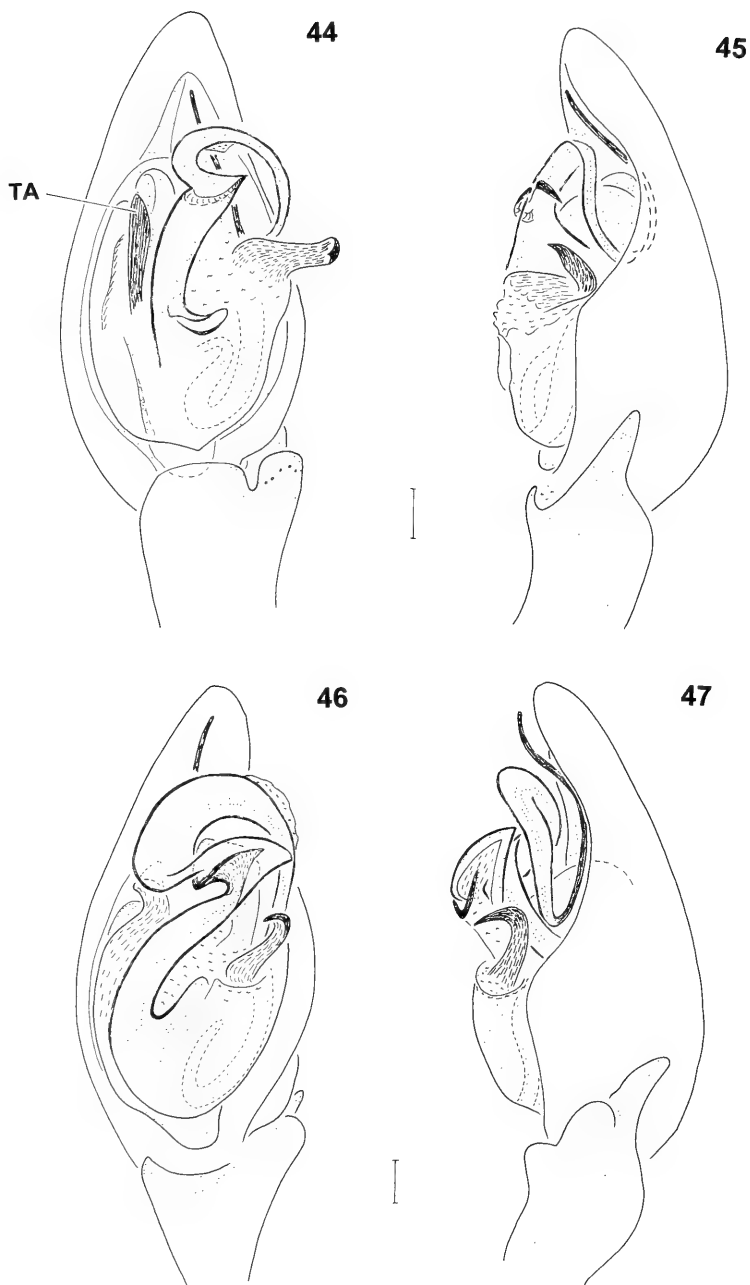
**Identification:** Levy (1998, p. 139, Figs 97-101).

**Material.** CRETE: RETHYMNO: Site 39 (b 1 ♀); Site 40 (c 22 ♀♀; d 2 ♂♂ 4 ♀♀ [CTH]); Site 41 (b 1 ♀) (all leg. Nikolakakis); IRAKLEIO: Site 47 (c 7 ♂♂ 10 ♀♀; d 2 ♀♀) (all leg. Nikolakakis); Site 46 (b 2 ♀♀); Site 50 (d 1 ♂ 2 ♀♀) (all leg. Papadimitrakis); LASITHI: Site 27 (b 1 ♀) (leg. Chatzaki); Site 64 (d 1 ♂; e 16 ♂♂ 16 ♀♀) (all leg. Papadimitrakis); Site 64 (f 5 ♂♂ 6 ♀♀) (leg. Nikolakakis); Site 63 (c 1 ♂) (leg. Stathi).

KOS: Kefalos – Ag. Ioannis, 1 km S, phrygana and adjacent pine forest, (1 ♂ 5 ♀♀, pitfall traps 26/6/2001 – 9/9/2001, leg. Chatzaki).

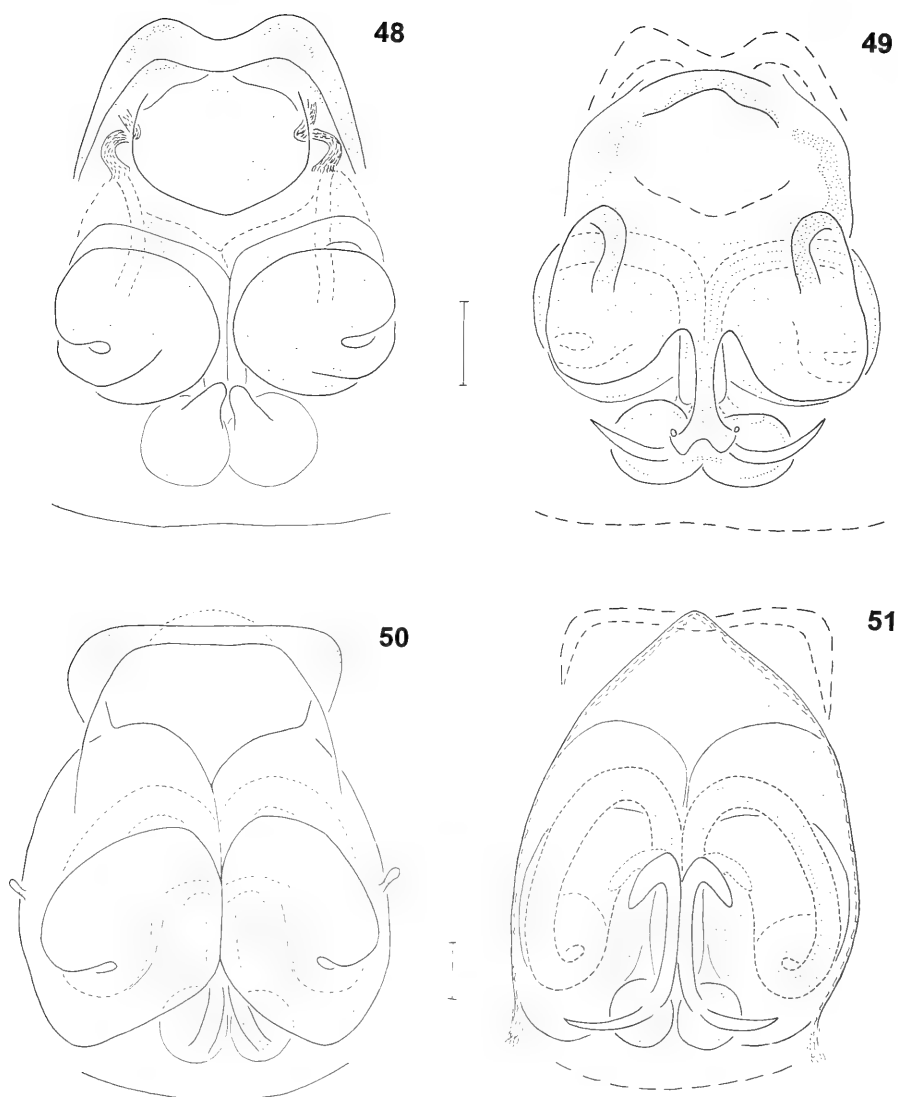
PELOPONNISOS: Mainalo Mt., alpine phrygana (2 ♂♂, pitfall traps 9/7/1997 – 12/10/1997, leg. Anastasiou).

**Taxonomy.** This species is very close to *Z. caucasius*. Apart from *Z. solstitialis* being larger, the two species differ in the following characters: in males of *Z. solstitialis* there is no prolateral tegular apophysis, the retrolateral tip of the embolar base is more pronounced and the embolus itself is longer, reaching almost to the tip of the



FIGS 44-47

*Zelotes caucasicus* (44-45), *Z. solstitialis* (46-47). Palp of ♂, ventral view (44, 46), retrolateral view (45, 47). TA: tegular apophysis. Scale lines 0.1mm.



FIGS 48-51

*Zelotes caucasicus* (48-49), *Z. solstitialis* (50-51). Epigyne (48, 50), vulva (49, 51). Scale lines 0.1mm.

cymbium. The tibial apophysis in *Z. solstitialis* has an additional broad, ventral lobe. Female genitalia differ in the shape of the central opening, in the dimensions of the two pouches, and in the course of the introductory ducts. A small gland exists on the lateral side of each dorsal pouch.

*Ecology.* As already stated by Levy (1998), adults of this species occur only during the dry months of summer and early autumn.

*Distribution.* Israel, Syria? (first record for Europe).

*Zelotes subterraneus* (C. L. Koch, 1833)

Figs 52-56, 120

*Identification:* Grimm (1985, p. 227, Figs 282, 303-304).

*Material.* CRETE: CHANIA: Site 2 (a 1 ♀; c 26 ♂♂ 1 ♀; d 1 ♀; e 2 ♀♀; f 8 ♀♀ [CTH]); Site 3 (c 33 ♂♂ 2 ♀♀; d 17 ♀♀; e 3 ♀♀); Site 5 (a 1 ♀; c 12 ♂♂ 5 ♀♀); Site 6 (a 4 ♀♀; b 2 ♀♀; c 3 ♀♀; h 38 ♂♂ 1 ♀; i 2 ♂♂ 9 ♀♀; j 4 ♀♀; k 1 ♀; l 4 ♀♀; m 1 ♀); Site 7 (i 9 ♂♂) (all leg. Lymberakis); Site 14 (a 1 ♂; b 1 ♂ 1 ♀; c 1 ♀); Site 15 (c 3 ♂♂ 1 ♀); Site 16 (a 4 ♂♂; b 7 ♀♀; c 6 ♀♀); Site 18 (a 2 ♂♂ 1 ♀; b 1 ♂); Site 19 (b 1 ♀); Site 21 (a 2 ♂♂) (all leg. Paragamian); RETHYMNO: Site 27 (a 2 ♀♀; b 15 ♂♂ 1 ♀; c 24 ♂♂ 18 ♀♀; d 2 ♂♂ 9 ♀♀; e 1 ♂ 4 ♀♀; f 14 ♀♀); Site 34 (b 10 ♂♂; c 3 ♂♂ 2 ♀♀; d 4 ♀♀); Site 37 (b 12 ♂♂; c 18 ♀♀; d 14 ♀♀; e 2 ♀♀); Site 38 (a 1 ♂ 11 ♀♀ b 4 ♀♀) (all leg. Chatzaki); Site 25 (c 16 ♂♂ 3 ♀♀) (leg. Lymberakis); Site 24 (a 1 ♀) (leg. Stathi); Site 28 (a 2 ♀♀); Site 29 (b 6 ♂♂); Site 32 (b 9 ♂♂); Site 39 (b 5 ♀♀); Site 40 (b 1 ♀; d 37 ♂♂ 9 ♀♀; e 1 ♀); Site 41 (a 4 ♀♀) (all leg. Nikolakakis); Site 30 (a 1 ♀); Site 33 (a 2 ♂♂ 2 ♀♀); Site 35 (a 1 ♂); Site 36 (a 1 ♀) (all leg. Trichas); IRAKLEIO: Site 42 (e 12 ♀♀; f 2 ♀♀; h 2 ♀♀; i 53 ♂♂ 11 ♀♀; j 20 ♂♂ 15 ♀♀; h 15 ♂♂; k 8 ♀♀) (all leg. Chatzaki); Site 43 (a 3 ♀♀; c 2 ♂♂ 1 ♀); Site 44 (a 4 ♀♀; c 7 ♂♂); Site 45 (a 2 ♀♀); Site 47 (a 2 ♀♀; b 7 ♂♂ 10 ♀♀; c 9 ♂♂; d 14 ♂♂ 6 ♀♀; e 2 ♀♀); Site 50 (a 4 ♀♀; d 4 ♂♂; e 31 ♂♂ 8 ♀♀); Site 52 (a 3 ♀♀; b 1 ♀; c 44 ♂♂ 6 ♀♀); Site 53 (a 1 ♀; c 20 ♂♂ 12 ♀♀); Site 54 (a 2 ♀♀; c 17 ♂♂ 3 ♀♀) (all leg. Nikolakakis); Site 46 (b 23 ♂♂); Site 49 (a 1 ♀; b 1 ♀; c 15 ♂♂); Site 51 (b 3 ♂♂) (all leg. Papadimitrakis); Site 48 (a 1 ♂) (leg. Trichas); LASITHI: Site 55 (a 5 ♀♀; b 36 ♂♂ 4 ♀♀; c 21 ♂♂ 7 ♀♀; d 1 ♀; e 1 ♀); Site 56 (a 1 ♀; b 16 ♂♂ 2 ♀♀; c 1 ♀); Site 57 (a 1 ♂ [CTH]; b 5 ♂♂ 1 ♀; c 2 ♀♀ [MHNG]); Site 73 (a 3 ♀♀; b 8 ♂♂ [MHNG]; c 26 ♂♂ 12 ♀♀; d 2 ♀♀; e 4 ♀♀) (all leg. Chatzaki); Site 71 (a 8 ♀♀; e 1 ♀; d 14 ♂♂) (all leg. Stathi); Site 64 (a 2 ♂♂ 1 ♀; c 3 ♀♀; e 5 ♂♂; f 28 ♂♂ 7 ♀♀) (all leg. Nikolakakis); Site 58 (b 10 ♂♂ 1 ♀); Site 62 (a 4 ♀♀; b 16 ♂♂ 1 ♀); Site 65 (a 2 ♀♀); Site 68 (b 5 ♂♂) (all leg. Papadimitrakis); Site 63 (a 6 ♀♀; c 38 ♂♂ 8 ♀♀); Site 60 (a 2 ♀♀); Site 71 (c 31 ♂♂; d 1 ♀; e 3 ♀♀) (all leg. Stathi); Site 59 (a 1 ♂; b 2 ♂♂ 1 ♀; c 1 ♂); Site 61 (a 14 ♂♂ 3 ♀♀; b 14 ♂♂ 4 ♀♀); Site 66 (a 2 ♀♀); Site 67 (a 2 ♂♂ 3 ♀♀); Site 70 (b 3 ♂♂ 7 ♀♀); Site 72 (a 2 ♀♀; b 12 ♂♂) (all leg. Trichas).

KARPATOS: Pyles – Volada, 1 km E, phrygana on an earlier burnt field, (5 ♀♀, pitfall traps 12/5/2001 – 23/8/2001, leg. Chatzaki).

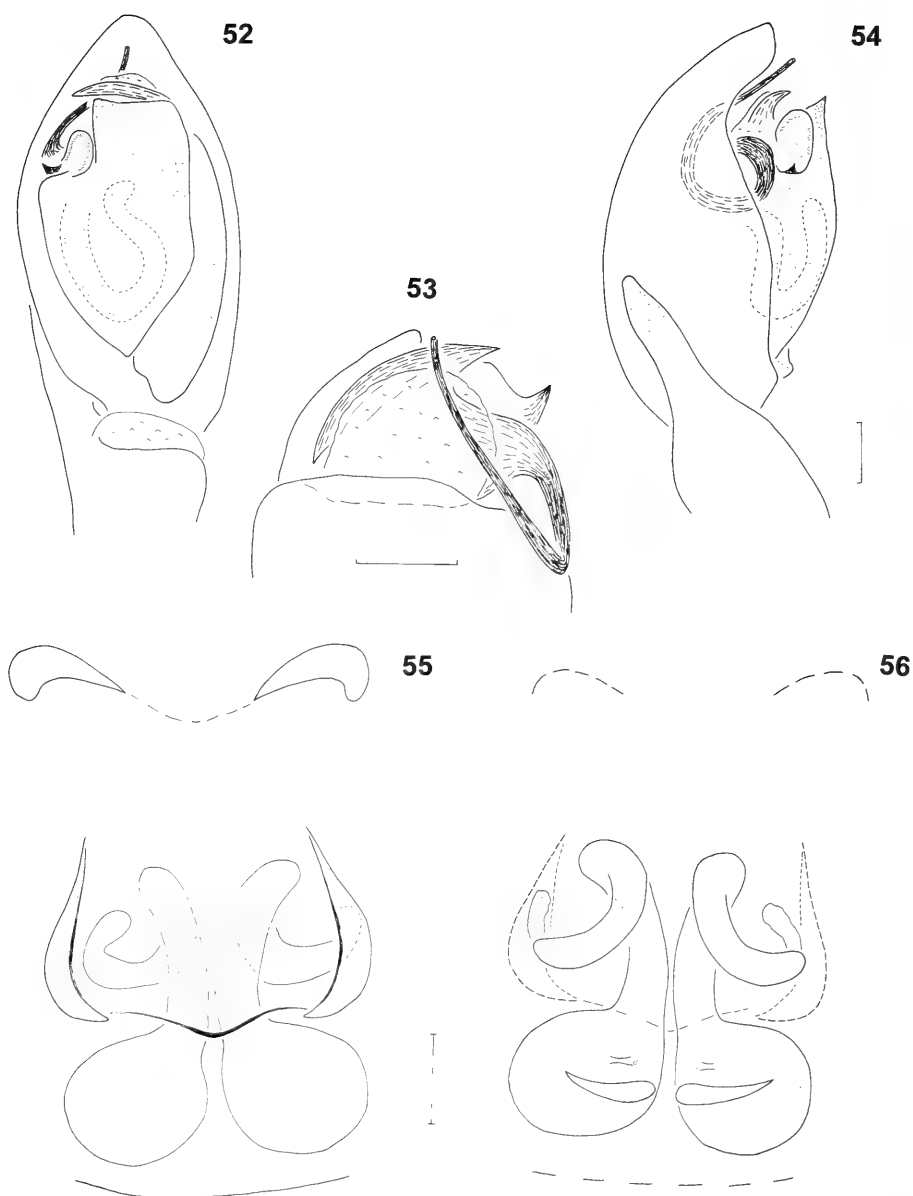
PELOPONNISOS: Mainalo Mt., alpine phrygana (2 ♀♀, pitfall traps 9/7/1997 – 12/10/1997, leg. Anastasiou).

Comparative material examined: *Z. subterraneus*: Austria, N. Tirol, Halltal 1000-1200m (3 ♀♀, 13/6/1992, leg. Knoflach); Austria, N. Tirol, Ötztal, Längenfeld (1 ♂, 8/8/1992, leg. Knoflach).

*Taxonomy.* This species clearly belongs to the *subterraneus* group. Among the central-European species of the group recorded by Grimm (1985), *Z. subterraneus* is closest to our specimens, albeit rather larger in size (TL ♂ = 5.7-7.8, ♀ = 5.8-9.2, according to Grimm versus TL ♂ = 3.8-6.8, ♀ = 6.4-9.2) and deviating slightly in the shape of the vulva. However, male characters fit well the description by Grimm (see Figs 52-56). A decision about the status of these populations is postponed until more material from Northern Greece is available.

*Ecology.* *Z. subterraneus* is common all over Crete, Gavdos and Dia (Fig. 120). Adult females are present throughout the year, males are very rare in the dry period. The peak of activity of both males and females occurs in autumn to early winter. *Z. subterraneus* is one of the very few zelotines collected in the pitfall traps during wintertime.

*Distribution.* Trans-Palearctic, in the temperate and boreal zones, recently recorded from Bulgaria (Deltshev & Blagoev, 2001) (first record for Greece).



FIGS 52-56

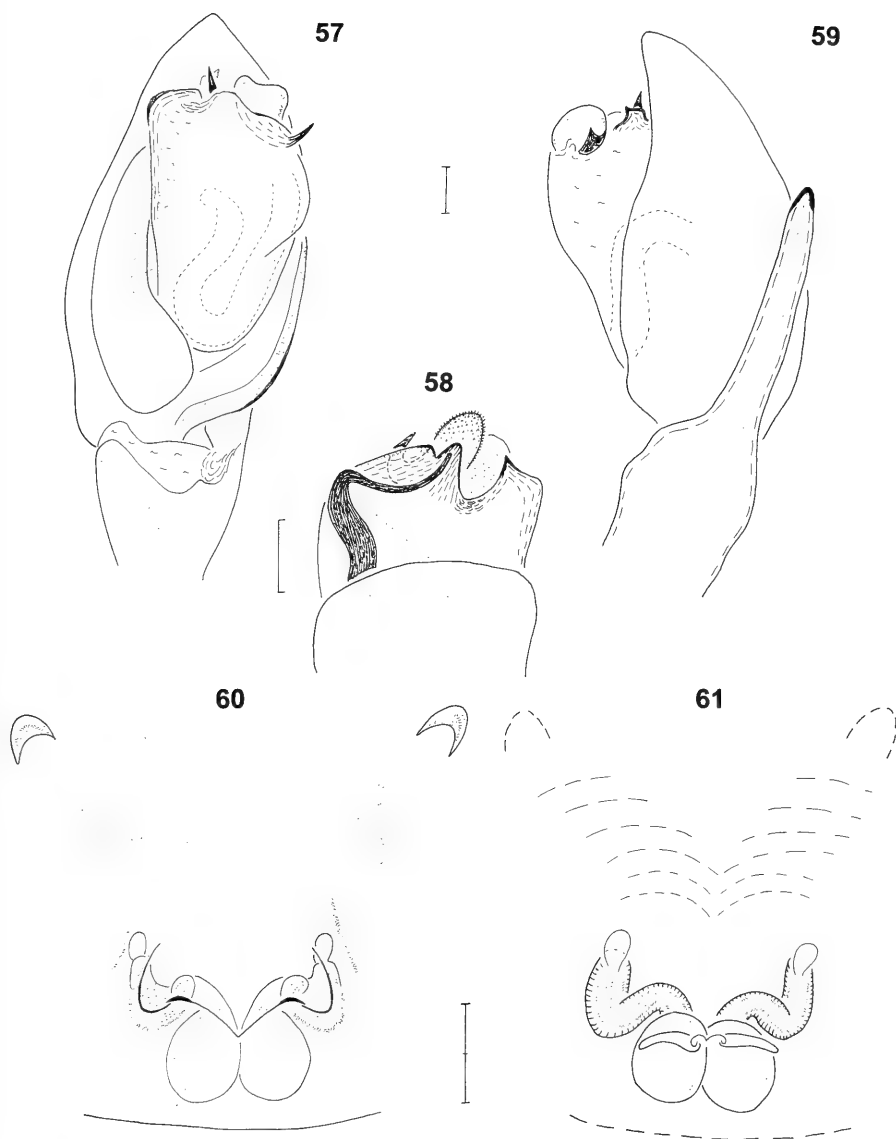
*Zelotes subterraneus*. Palp of ♂, ventral view (52), dorsal view (53), retrolateral view (54), epigyne (55), vulva (56). Scale lines 0.1mm.

***Zelotes creticus* (Kulczyński, 1903)**

Figs 57-61, 121

*Identification:* Kulczyński (1903, p. 42, Fig. 4).

*Material.* CRETE: CHANIA: Site 5 (a 5 ♀♀; b 1 ♀; c 23 ♂♂ 4 ♀♀); Site 6 (a 1 ♂; b 1 ♀; c 2 ♀♀; d 1 ♀; e 8 ♀♀; h 5 ♂♂; i 7 ♂♂ [CTh]; l 1 ♂ 1 ♀); Site 7 (a 1 ♂; b 8 ♀♀; c 2



FIGS 57-61

*Zelotes creticus*. Palp of ♂, ventral view (57), dorsal view (58), retrolateral view (59), epigyne (60), vulva (61). Scale lines 0.1mm.

♀♀; d 9 ♀♀; e 13 ♀♀; f 3 ♀♀; g 18 ♂♂; h 38 ♂♂; h 5 ♀♀; i 1 ♂ 2 ♀♀; j 3 ♀♀; Site 8 (a 3 ♂♂; b 4 ♂♂; d 1 ♀; f 1 ♀; h 4 ♂♂ 1 ♀; i 11 ♂♂ 1 ♀; j 2 ♂♂; k 1 ♀); Site 9 (a 8 ♂♂ 1 ♀; b 7 ♂♂ 1 ♀; c 3 ♀♀; d 3 ♀♀; e 7 ♂♂; f 4 ♂♂; g 1 ♂ 2 ♀♀) (all leg. Lymberakis); Site 11 (a 1 ♀; b 3 ♀♀); Site 12 (e 1 ♀) (all leg. Stathi); RETHYMNO: Site 25 (a 7 ♀♀; c 25 ♂♂ 4 ♀♀); Site 26 (a 4 ♀♀; b 1 ♀; c 15 ♂♂ 3 ♀♀) (all leg. Lymberakis); Site 32 (a 12 ♀♀; b 10 ♂♂ 5 ♀♀); Site 40 (a 7 ♀♀ [CTh]; b 6 ♀♀; c 2 ♂♂; d 47 ♂♂ 7 ♀♀; d 3 ♂♂ 3 ♀♀ [MHNG]; e 1 ♀) (all leg. Nikolakakis).

**Taxonomy.** *Zelotes creticus* was described by Kulczyński (1903) based on two female specimens and the species has not been revised since that time. We collected females of this species together with their males, which we present here for the first time.

Measurements ♂ (♀), n = 13 (12): TL: 5.6-7.4 (6-9.1), PL: 2.4-3.4 (2.6-3.6), PW: 1.8-2.6 (2-2.8), OL: 2.8-3.7 (2.6-5.1), PL/PW: 1.19-1.66 (1.18-1.4).

♂ ♀: Large spiders of dark colour. Eyes round. Posterior and anterior rows of eyes straight. Males with large, brown scutum on the opisthsoma.

Legs: Me III-IV with apical preening combs. Ta and Me I-II with stripes of ventral scopula hairs, Ta and Me III-IV with dense spiny hairs. Spination: Fe: I d 2; II d 3; III d 3-5; IV d 2-4. Pa: I-II, IV -; III r 1. Ti: I-II -; III-IV spinose. Me: I-II -; III-IV spinose.

♂ Pedipalp (Figs 57-59): Tibial apophysis slender, straight, longer than  $\frac{1}{2}$  of the length of the cymbium. Tegulum robust, with a sharp projection at its anterior/pro-lateral edge, probably corresponding to terminal apophysis. Embolus short, filiform, transverse, starting from dorsal/retrolateral front of tegulum, retinaculum at its anterior/retrolateral corner.

Epigyne (Fig. 60): Anterior margins small, cap-like, far in front of the areola. Lateral margins relatively short, curved; posterior margin faint, biconvex. Introductory orifices at the edge of lateral and posterior margins.

Vulva (Fig. 61): Introductory ducts short and sclerotized, transverse, with glandular heads at their anterior ends. Spermathecae globular, with fertilisation ducts situated at their anterior part.

**Ecology.** *Z. creticus* is common in the middle to high altitudes of the mountains of western Crete, but absent from eastern Crete. Also the type material of Kulczyński was collected from middle altitudes of western Crete (Chania, Askifou, 1000m). The species has also been caught three times in phrygana of the lowland (Sites 25, 26 and 32) (Fig. 121). Together with *Callilepis cretica*, *Drassodes lapidosus*, *Drassyllus praeficus* and others (see also Chatzaki et al. 2002 a, b), *Z. creticus* belongs to the few gnaphosid species which become more numerous with increasing altitude. The peak of activity of males occurs in late summer and of females in late spring and early autumn.

**Distribution.** Crete (endemic).

### *Zelotes* cf. *ilotarum* (Simon, 1884)

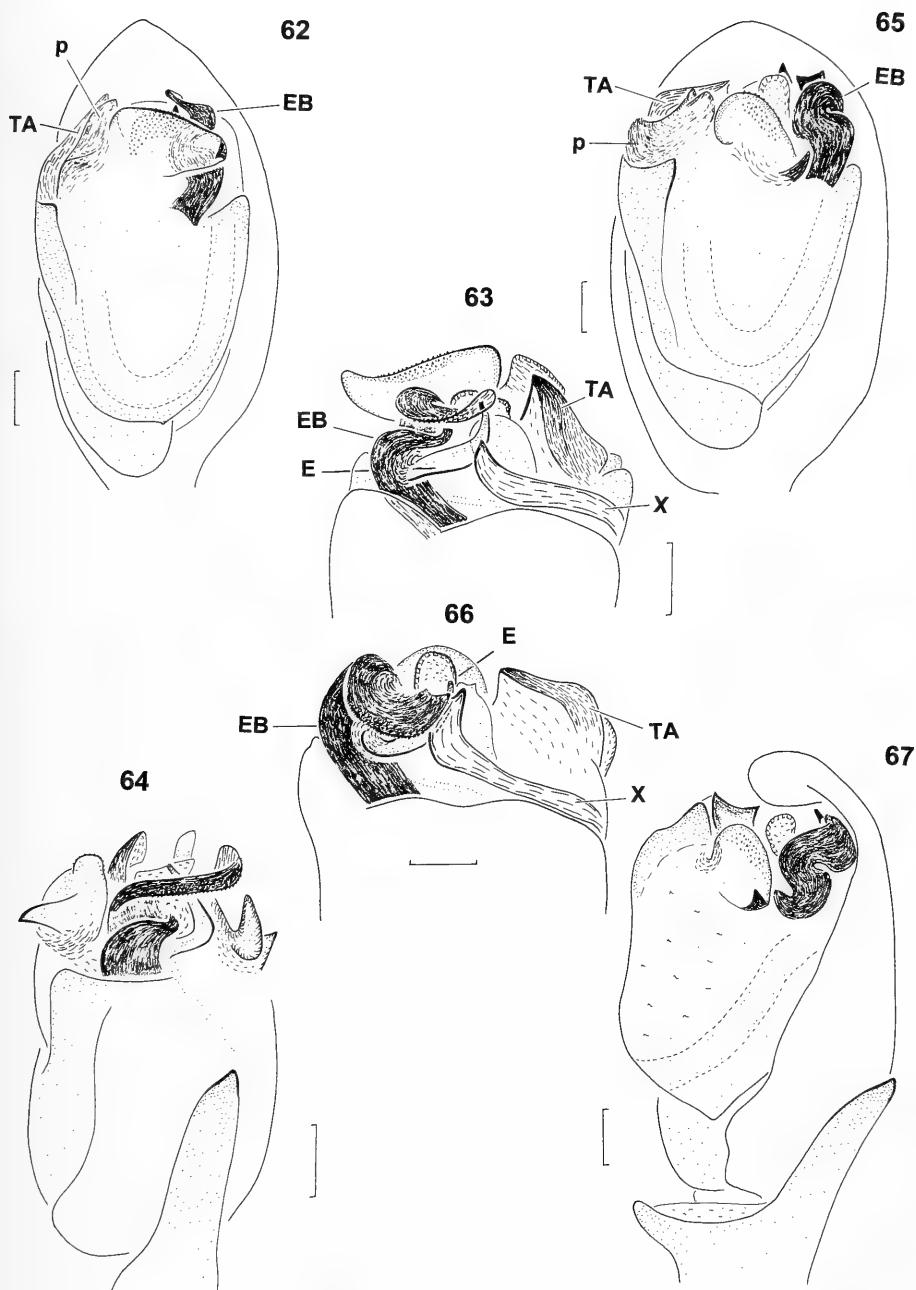
Figs 62-64, 68-69, 121

**Material.** CRETE: CHANIA: Site 4 (c 2 ♂♂ 1 ♀) (leg. Lymberakis); IRAKLEIO: Site 44 (a 9 ♂♂ 6 ♀♀; b 1 ♀); Site 47 (a 9 ♀♀; b 6 ♀♀; d 27 ♂♂ 2 ♀♀ d 2 ♂♂ 2 ♀♀ [MHNG]; e 6 ♀♀ [CTh]) (all leg. Nikolakakis); Site 49 (a 1 ♂ [CTh]; a 5 ♀♀; b 2 ♀♀; c 5 ♂♂ 3 ♀♀); Site 51 (a 21 ♀♀; b 29 ♂♂ 1 ♀) (all leg. Papadimitrakis); LASITHI: Site 59 (a 59 ♂♂ 12 ♀♀; b 8 ♂♂ 1 ♀; c 38 ♂♂ 20 ♀♀) (all leg. Trichas).

Comparative material examined: *Z. ilotarum*: Peloponnisos, Aigio (2 ♂♂, 3/4/1939, Col. Hadjissarantos, 2780, ZMUA); Attiki, Kato Souli (4 ♀♀, 14/4/1939, Col. Hadjissarantos, 2781, ZMUA).

**Taxonomy.** *Z. ilotarum* was described by Simon (1884) on the basis of females from Naxos and Athens. It was rediscovered in Peloponnisos and Attiki by Hadjissarantos (1940), who presented the first illustration of the epigyne and described the male for the first time (p. 82, Figs 26-27). This species is characterised by the distinct shape of the embolic division (EB and E) of the male palp (Figs 65-67) and by





FIGS 62-67

*Zelotes cf. ilotarum* (62-64), *Z. ilotarum* (65-67). Palp of ♂, ventral view (62, 65), dorsal view (63, 66), retrolateral view (64, 67). TA: terminal apophysis, p: prolateral process, EB: embolar base, E: embolus X: dorsal extension. Scale lines 0.1mm.

the female epigyne, which is narrow compared to its length (Figs 70-71). The prominent edge of the tegulum has a prolateral process (p), a dorsal extension (X) of the intercalary sclerite (sensu Platnick & Shadab, 1983) and a transverse terminal apophysis (TA), which are also distinctive characters. We have found males and females of a species from Crete, which is very close to *Z. ilotarum*, but not identical, as will be discussed later.

Measurements ♂ (♀), n = 11 (12): TL: 5.2-7.1 (5.7-9.2), PL: 2.4-3 (2.5-3.5), PW: 1.8-2.4 (2-2.7), OL: 2.6-3.8 (3-4.9), PL/PW: 1.21-1.37 (1.19-1.45).

♂ ♀: Dark brown spiders of medium to large size. Eyes round, posterior and anterior rows straight. Males with large scutum on opisthosoma.

Legs: Me III-IV with apical preening combs. Ta and Me I-II with scopula hairs, Ta and Me III-IV with spiny hairs. Spination: Fe: I-II d 2; III-IV d 3-6. Pa: I-II - ; III-IV r 1. Ti: I-II - ; III-IV spinose. Me: I-II v 2; III-IV spinose.

♂ Pedipalp (Figs 62-64): Tibial apophysis long, tapering. Tegulum robust, strongly sclerotized, with a prolateral process situated at its apical angle (p). Intercalary sclerite of tegulum continuing to dorsal side by a transverse extension (X). Embolic division on retrolateral side of tegulum, with a strong, S-shaped base (EB) bearing microdenticles on its surface and a small sclerotized embolus (E), visible only from the dorsal side of the bulbus. Terminal apophysis (TA) triangular, dorsal. Retinaculum transverse, at apical end of tegulum.

Epigyne (Fig. 68): Anterior margin with two caps, well separated. Lateral margins narrow, parallel to each other, with introductory orifices at their rims.

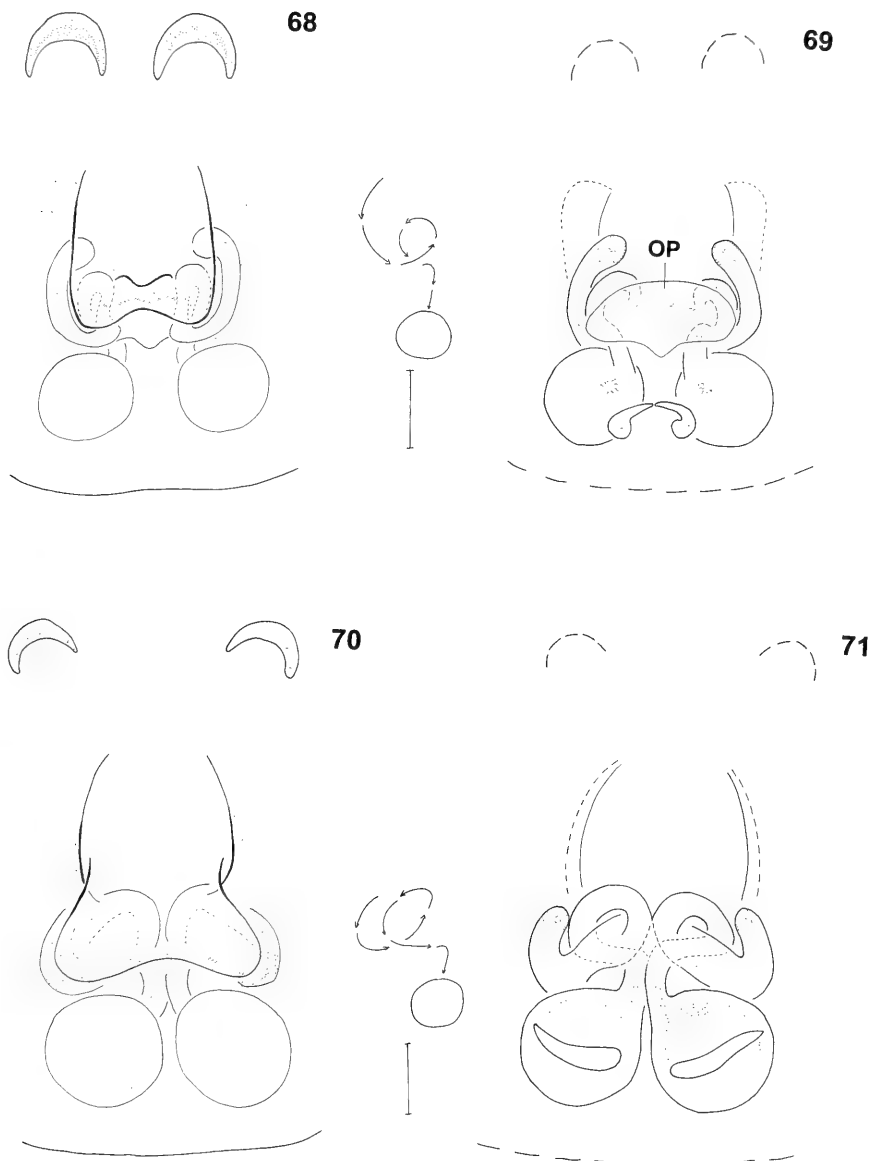
Vulva (Fig. 69): Introductory ducts short, coiled, leading to the centre, to globular spermathecae. Glandular heads located below lateral margins, anterior to the introductory ducts. Dorsal surface of the introductory channels fused to an oval plate (OP).

*Comments.* *Z. ilotarum* and our species apparently are very similar. The same structures are present in males as well as in females. However, the 'true' *Z. ilotarum* (sensu Hadjissarantos) differs in the following characters: in males (compare Figs 62-64 and 65-67) the prolateral tegular process (p) is broader; the S-shaped sclerotized embolar base is stronger, its end wider and bifid; the terminal apophysis is more transverse. In females (compare Figs 68-69 and 70-71) the anterior caps are further apart than the width of the lateral margins; the spermathecae are larger and closer together; the glandular heads are at the same level as the introductory ducts. Differences in the oval plate of the females examined are probably due to a difference in age.

When a more thorough knowledge of the gnaphosid fauna of Greece has been obtained and the distributions of the species has become more precisely known, it will be possible to decide whether there already exists a species name available in the literature, or whether this form should be regarded as a variation of *Z. ilotarum* only.

*Ecology.* *Z. cf. ilotarum* is not very common on Crete (Fig. 121). It has been found at several sites in central and eastern Crete, mainly in the lowlands. It has not been found above 1000m. The peak of activity in males occurs in early autumn and in females in late spring.

*Distribution.* GREECE: Attiki ?; Peloponnisos ? (Hadjissarantos, 1940); Naxos ? (Simon, 1884); Crete.



FIGS 68-71

*Zelotes* cf. *ilotarum* (68-69), *Z. ilotarum* (70-71). Epigyne (68, 70), vulva (69, 71). OP: oval plate. Scale lines 0.1mm.

*Zelotes scrutatus* (O. P.-Cambridge, 1872)

Figs 72-76, 122

*Drassodes cofiniotes*: Roewer, 1928 (p. 105, Fig.10), CRETE: Rethymno, Topolia (type locality); Roewer 1954 (p. 385); Bonnet, 1956 (p. 1563); Levy, 1998.

*Zelotes bucharensis* Charitonov, 1946: p. 26, Figs 39-40, UZBEKISTAN, Yakkabagh (type locality). **Syn. n.**

*Identification:* Levy (1998, p. 125, Figs 62-68).

*Material.* CRETE: CHANIA: Site 1 (a 3 ♂♂ 6 ♀♀; b 4 ♂♂; c 24 ♂♂); Site 2 (a 9 ♂♂ 3 ♀♀; b 1 ♂ 2 ♀♀); Site 3 (a 3 ♂♂; b 1 ♂); Site 4 (a 1 ♀; b 2 ♂♂ 5 ♀♀); Site 5 (a 1 ♂; b 1 ♂) (all leg. Lymberakis); Site 13 (a 2 ♂♂ 10 ♀♀; c 1 ♂; d 2 ♂♂ 4 ♀♀); Site 14 (a 1 ♂ 1 ♀; c 4 ♀♀; d 3 ♂♂ 2 ♀♀); Site 15 (d 2 ♂♂); Site 16 (d 4 ♂♂ 3 ♀♀); Site 18 (d 1 ♀); Site 19 (a 1 ♂ 5 ♀♀; c 1 ♂ 3 ♀♀; d 5 ♂♂ 2 ♀♀) (all leg. Paragamian); RETHYMNO: Site 25 (a 8 ♂♂; a 2 ♀♀; b 4 ♀♀) (all leg. Lymberakis); Site 27 (a 22 ♂♂ 3 ♀♀; b 8 ♂♂ 2 ♀♀; c 1 ♀; f 1 ♂); Site 34 (a 1 ♂) (all leg. Chatzaki); Site 28 (a 4 ♀♀; b 1 ♂ 2 ♀♀); Site 32 (a 3 ♂♂ 3 ♀♀); Site 39 (a 5 ♂♂ 2 ♀♀; b 2 ♂♂ 2 ♀♀); Site 40 (b 11 ♂♂ 1 ♀; c 4 ♂♂ 4 ♀♀; d 1 ♀); Site 41 (a 11 ♂♂ 2 ♀♀; b 21 ♂♂ 2 ♀♀) (all leg. Nikolakakis); IRAKLEIO: Site 42 (e 2 ♂♂ 1 ♀; g 1 ♀; f 2 ♀♀) (all leg. Chatzaki); Site 44 (a 5 ♂♂ [CTh]; a 2 ♀♀; b 7 ♂♂ 10 ♀♀); Site 47 (a 4 ♂♂ 1 ♀; b 25 ♂♂; b 8 ♀♀ [CTh]; c 2 ♂♂ 5 ♀♀ [MHNG]; e 3 ♂♂) (all leg. Nikolakakis); Site 46 (a 3 ♂♂ 2 ♀♀; b 1 ♀); Site 49 (b 2 ♀♀); Site 50 (c 2 ♂♂ 2 ♀♀; d 1 ♀); Site 51 (a 1 ♀) (all leg. Papadimitrakis); LASITHI: Site 55 (a 4 ♂♂ 1 ♀; b 5 ♂♂ 1 ♀; c 1 ♀); Site 73 (a 1 ♂; b 1 ♀) (all leg. Chatzaki); Site 58 (a 1 ♂); Site 62 (a 1 ♂; b 1 ♂); Site 64 (d 2 ♂♂ 1 ♀; e 1 ♂ 1 ♀) (all leg. Papadimitrakis); Site 63 (b 2 ♂♂); Site 71 (a 3 ♂♂; b 3 ♂♂ 1 ♀; c 1 ♂) (all leg. Stathi); Site 66 (a 3 ♂♂ 3 ♀♀); Site 70 (b 1 ♀) (all leg. Trichas).

PELOPONNISOS: Mainalo Mt., alpine phrygana (1 ♂, pitfall traps 9/7/1997 – 12/10/1997, leg. Anastasiou).

Comparative material examined: *Z. scrutatus*: Israel, Hatira ridge near Sede Boger (1 ♂ 1 ♀, 8/1991, Col. Lubin, 14628).

*Taxonomy.* The taxonomical characters of this species fit well the description of Levy (1998) and with the specimens received for comparison from Israel (see terminal apophysis (TA), embolar base and tip of embolus in Figs 72-73). In our material, these characters and the shape of the median plate of the females are constant, while the shape of the introductory channel varies, as reported by Levy (1998). *Z. bucharensis* Charitonov, 1946 is proposed here as a new synonym, on the basis of congruence in the shape of the median plate and the tibial apophysis (see Charitonov 1946, Figs 39-40).

*Ecology.* *Z. scrutatus* is common and widespread all over Crete (Fig. 122), occurring also on the surrounding islands of Gavdos and Dia and on mainland Peloponnisos. On Crete, it reaches altitudes up to 1200m, but seems to prefer the lowlands. Adults' peaks of activity occur from late spring to early autumn.

*Distribution.* North Africa, Israel, Syria, Uzbekistan; GREECE: Attiki, Kokkinos Mylos (Hadjissarantos, 1940, sub *D. cofiniotes*).

### *Zelotes minous* Chatzaki sp. n.

Figs 77-81, 122

*Etymology:* The name of this species is derived from Minos, king of Crete during the Minoan era; adjective.

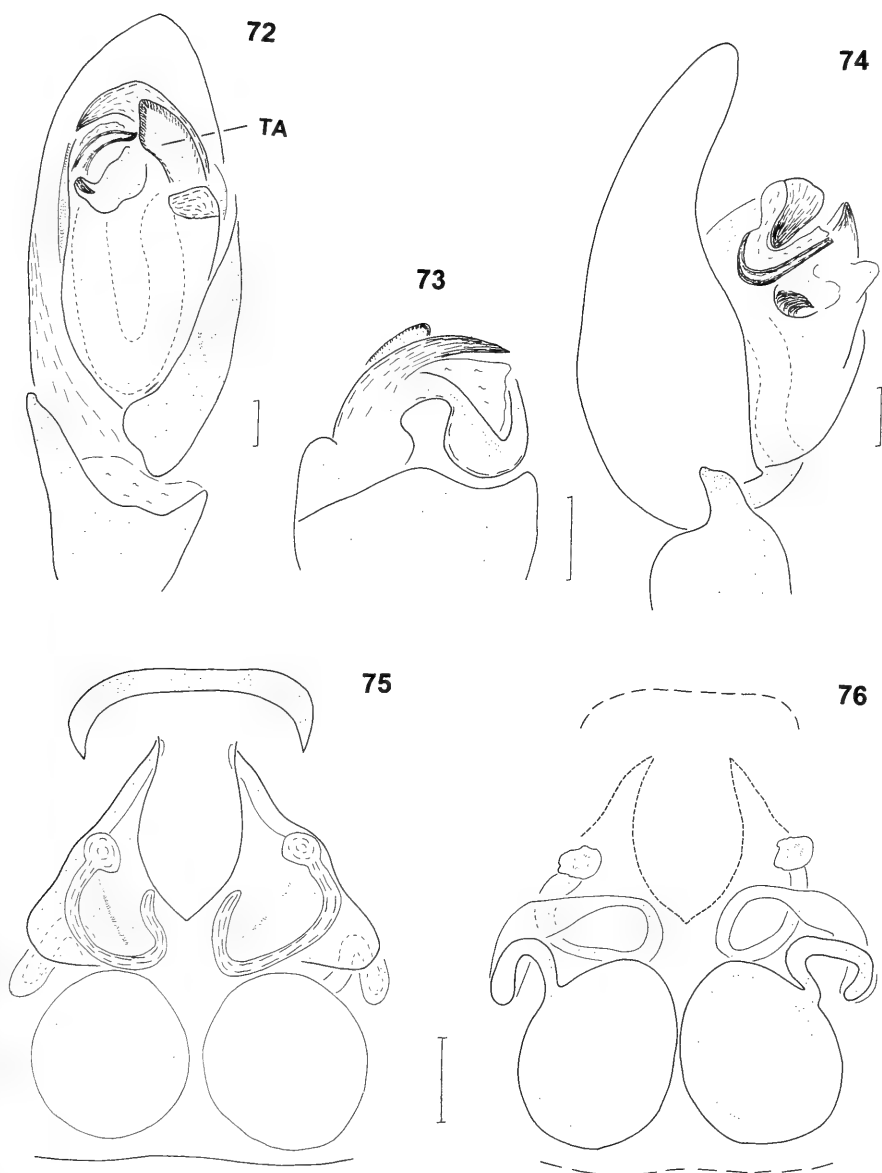
*Material.* Type material: Site 27a (Eksantis, Agios Kyprianos) (1 ♂ holotype, 4 ♀♀ paratypes, [NHMC]; 1 ♂ 1 ♀ paratypes [MHNG]).

CRETE: CHANIA: Site 1 (b 1 ♀); Site 6 (g 1 ♀) (all leg. Lymberakis); Site 16 (a 1 ♀; d 3 ♀♀); Site 17 (c 1 ♂); Site 19 (d 3 ♂♂) (all leg. Paragamian); RETHYMNO: Site 27 (a 2 ♂♂ 5 ♀♀; b 1 ♀) (all leg. Chatzaki); IRAKLEIO: Site 52 (b 1 ♀); Site 53 (b 1 ♀); Site 54 (b 1 ♂); (all leg. Nikolakakis); LASITHI: Site 55 (a 9 ♂♂; b 2 ♂♂ [CTh]); Site 73 (a 2 ♀♀) (all leg. Chatzaki); Site 63 (b 1 ♀) (leg. Stathi); Site 65 (a 1 ♂) (leg. Papadimitrakis).

KARPATOS: Pyles – Volada, 1 km E, phrygana on an earlier burnt field, (4 ♂♂ 1 ♀, pitfall traps 12/5/2001 – 23/8/2001, leg. Chatzaki).

Comparative material examined: *Z. puritanus* Chamberlin, 1922: Austria, N. Tirol, Innsbruck, Martinswand (3 ♂♂ 1 ♀, pitfall traps 23/4/1963 – 7/6/1963, CTh).

*Taxonomy.* Measurements ♂(♀), n = 7 (8): TL: 2.9-4.8 (4.4-4.9), PL: 1.5-2.1 (1.7-1.9), PW: 0.9-1.6 (1.3-1.6), OL: 1.4-2.5 (2.3-2.8), PL/PW: 1.2-1.66 (1.13-1.3).

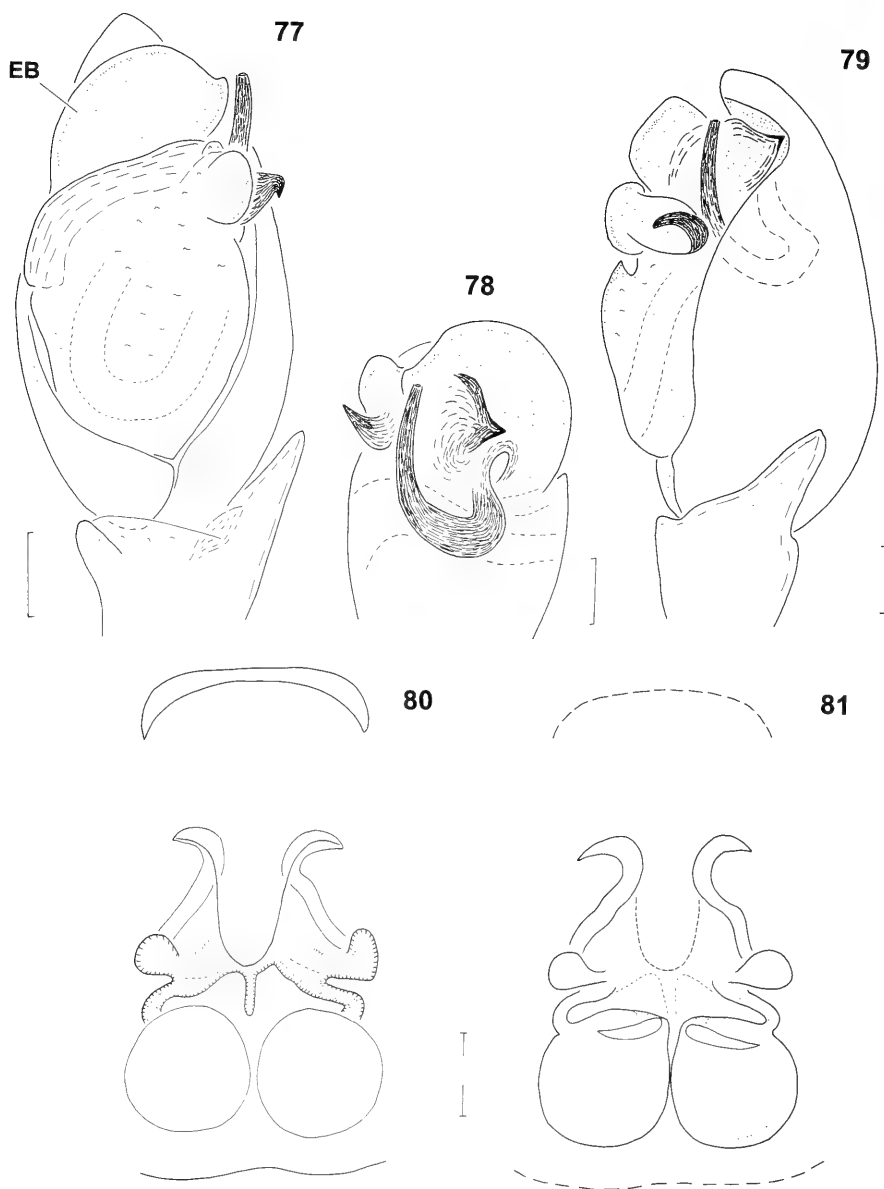


FIGS 72-76

*Zelotes scrutatus*. Palp of ♂, ventral view (72), dorsal view (73), retrolateral view (74), epigyne (75), vulva (76). Scale lines 0.1mm.

♂ ♀: Small spiders of light brown colour. PME closer to PLE than to each other, smaller than the rest of eyes, round.

Legs: Me III-IV with apical preening combs. All Ta, Me, Ti full of long hairs. All Co, Me, Ta, Pa and Ti III-IV yellow, other articles brown. Spination: Fe: I-IV d 1-3. Pa: I-IV -. Ti: I-II - ; III v 3 r 1; IV v 5-6 r 1. Me: I-II - ; III p 3 r 2; IV v 2 p 1 r 2.



FIGS 77-81

*Zelotes minous* sp. n. Palp of ♂, ventral view (77), dorsal view (78), retrolateral view (79), epigyne (80), vulva (81). EB: embolar base. Scale lines 0.1mm.

♂ Pedipalp (Figs 77-79): Tibial apophysis short. Tegulum broadly membranous. Embolar base (EB) bulging, with a sclerotized dorsal process. Embolus short, directed along retrolateral side of tegulum, rising from dorsal end of embolar base.

Epigyne (Fig. 80): Anterior margin continuous. Median plate tongue-like, its anterior ends curved.

Vulva (Fig. 81): Introductory orifices probably situated at curved part of median plate, leading to a large pouch, with lateral glandular heads. Introductory ducts short. Spermathecae large, globular.

*Comments.* This species is closely related to *Z. puritanus* Chamberlin, 1922 (see Grimm 1985, Figs 247c, 248, 270-271). Apart from being much larger, *Z. puritanus* also differs in details of the embolic division of the male palp and in the shape of the median plate of the epigyne.

*Ecology.* *Z. minous* sp. n. is widespread on the island of Crete, though not very common (Fig. 122). It also occurs on the islands of Gavdos and Dia. It prefers phryganic habitats close to the sea and was never collected in mountainous areas.

*Distribution.* Crete, Karpathos (Greek endemic?).

### *Zelotes nilicola* (O. P.-Cambridge, 1874)

Figs 82-86, 118

*Identification:* Platnick & Shadab (1983, p.186, Figs 263-266), Levy (1998, p. 142, Figs 104-107).

*Material.* CRETE: CHANIA: Site 18 (c 1 ♂ 1 ♀; d 3 ♂ ♂ 2 ♀ ♀) (all leg. Paragamian); IRAKLEIO: Site 48 (a 5 ♂ ♂ 1 ♀) (leg. Trichas); LASITHI: Site 64 (d 4 ♂ ♂ 3 ♀ ♀) (leg. Papadimitrakis).

*Taxonomy.* The taxonomical characters of this species fit well the descriptions of Platnick & Shadab (1983) and of Levy (1998). The palpal organ possesses a strange, saw-like, dorsal process (p) originating from the embolar base, as already reported by Levy (1998).

*Ecology.* This species is rare on Crete (Fig. 118). It has been collected at three sites on Crete and at one on Gavdos, all of them close to the coast and to fresh water, in areas with sandy soil. Adults occur in late summer.

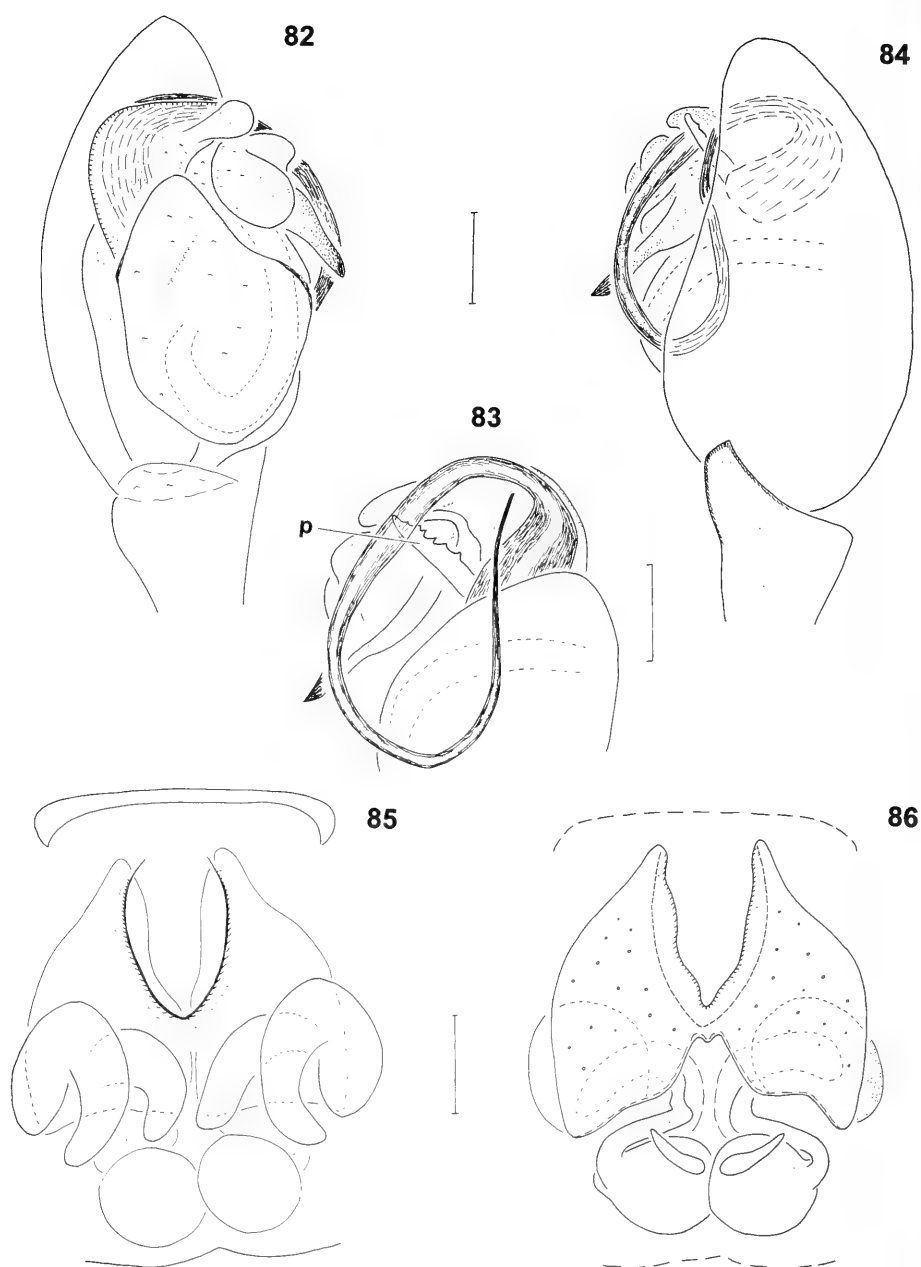
*Distribution.* Circum-Mediterranean: Egypt, Tunisia, Corsica, Giglio Isl., Cyprus, Israel, Canary Isls., GREECE: Attiki: Athens (Platnick & Shadab, 1983), introduced to the USA (according to Platnick & Shadab, 1983).

### *Zelotes labilis* Simon, 1914

Figs 87-90, 93-96, 98-101, 104, 123

*Identification:* Hadjissarantos (1940, p. 82, Figs 28-29).

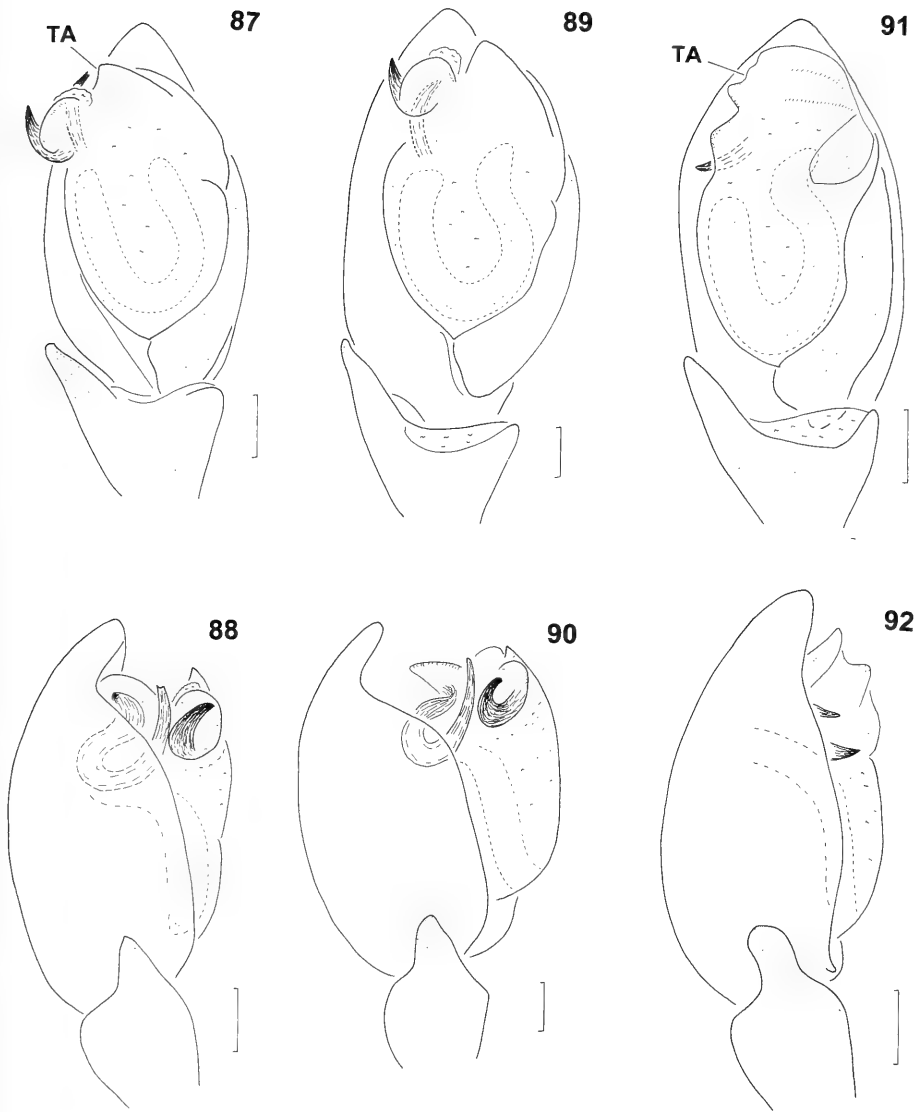
*Material.* CRETE: CHANIA: Site 3 (a 10 ♂ ♂ 5 ♀ ♀; b 2 ♂ ♂ 2 ♀ ♀; c 1 ♀); Site 4 (b 1 ♀); Site 6 (d 1 ♂; e 4 ♂ ♂ 1 ♀; f 1 ♂); Site 7 (e 1 ♂ 1 ♀; f 1 ♀; g 1 ♀); Site 8 (e 1 ♂; f 2 ♂ ♂ 1 ♀; g 2 ♀ ♀; k 1 ♀); Site 9 (a 8 ♀ ♀; c 2 ♂ ♂ 1 ♀; d 7 ♀ ♀; g 3 ♀ ♀); Site 10 (a 1 ♂ 4 ♀ ♀); (all leg. Lymberakis); Site 14 (c 15 ♂ ♂ 2 ♀ ♀; d 5 ♂ ♂ 5 ♀ ♀); Site 15 (c 4 ♂ ♂; d 2 ♂ ♂ 1 ♀); Site 16 (c 21 ♂ ♂ 1 ♀; d 15 ♂ ♂ 11 ♀ ♀; 1 ♂ [CTh]); Site 17 (c 7 ♂ ♂; d 2 ♂ ♂ 3 ♀ ♀); Site 18 (a 1 ♀; c 5 ♂ ♂; c 2 ♀ ♀ [CTh]; d 2 ♂ ♂ 5 ♀ ♀); Site 19 (c 5 ♂ ♂ 1 ♀; d 6 ♂ ♂ 2 ♀ ♀); Site 20 (a 1 ♂; b 1 ♂ 1 ♀); Site 21 (d 3 ♀ ♀); Site 22 (b 4 ♂ ♂); Site 23 (c 7 ♂ ♂ 6 ♀ ♀) (all leg. Paragamian); RETHYMNO: Site 25 (a 7 ♀ ♀; b 1 ♀) (all leg. Lymberakis); Site 27 (a 27 ♂ ♂ 6 ♀ ♀; b 1 ♂ 2 ♀ ♀) (all leg. Chatzaki); Site 34 (a 2 ♂ ♂ 3 ♀ ♀; b 1 ♂ 7 ♀ ♀; e 1 ♀); Site 37 (a 18 ♂ ♂ 13 ♀ ♀; b 1 ♂ 4 ♀ ♀; e 1 ♂ 1 ♀) (all leg. Chatzaki); Site 35 (a 1 ♀) (leg. Trichas); Site 28 (a 1 ♂ 2 ♀ ♀; b 10 ♂ ♂ 9 ♀ ♀); Site 29 (b 1 ♀); Site 32 (a 3 ♀ ♀; b 1 ♀); Site 39 (a 2 ♂ ♂ 4 ♀ ♀); Site 40 (b 8 ♂ ♂ 10 ♀ ♀; c 9 ♀ ♀); Site 41 (a 18 ♂ ♂ 11 ♀ ♀; b 1 ♂ 9 ♀ ♀) (all leg. Nikolakakis); IRAKLEIO: Site 42 (e 8 ♂ ♂ 4 ♀ ♀; f 8 ♂ ♂ 1 ♀; g 2 ♀ ♀) (all leg. Chatzaki); Site 43 (a 1 ♂; b 1 ♂ 2 ♀ ♀); Site 44 (b 5 ♂ ♂ 1 ♀); Site 45 (a 3 ♂ ♂ 7 ♀ ♀; b 1 ♂ 6 ♀ ♀); Site 46 (a 17 ♂ ♂ 11 ♀ ♀; b 7 ♀ ♀); Site 47 (b 12 ♂ ♂ 16 ♀ ♀; e 2 ♂ ♂ 1 ♀); Site 49 (b 2 ♂ ♂



FIGS 82-86

*Zelotes nilicola*. Palp of ♂, ventral view (82), dorsal view (83), retrolateral view (84), epigyne (85), vulva (86). p: dorsal process. Scale lines 0.1mm.





FIGS 87-92

*Zelotes labilis*, specimens from the lowlands (87-88), specimens from high altitudes (89-90), *Z. daidalus* sp. n. (91-92). Palp of ♂, ventral view (87, 89, 91), retrolateral view (88, 90, 92). TA: terminal apophysis. Scale lines 0.1mm.

5 ♀♀; Site 50 (c 1 ♂ 6 ♀♀; d 1 ♀); Site 51 (a 1 ♂ 1 ♀; b 1 ♀); Site 52 (b 1 ♀); Site 53 (b 1 ♀) (all leg. Nikolakakis); LASITHI: Site 55 (a 8 ♂♂ 2 ♀♀; b 2 ♂♂ 4 ♀♀); Site 56 (a 6 ♂♂ 4 ♀♀; b 1 ♂ 1 ♀); Site 57 (a 7 ♂♂ 4 ♀♀); Site 73 (a 1 ♂ 13 ♀♀; b 1 ♂ 1 ♀) (all leg. Chatzaki); Site 58 (a 2 ♂♂ 4 ♀♀; b 4 ♀♀); Site 62 (a 1 ♂ 3 ♀♀; b 1 ♀); Site 64 (d 1 ♂ 1 ♀); Site 65 (a 1 ♀); Site 68 (a 1 ♀) (all leg. Nikolakakis); Site 63 (b 1 ♂ 1 ♀); Site 71 (b 3 ♂♂ 5 ♀♀ [MHNG]) (all leg. Stathi); Site 59 (a 1 ♂) (leg. Trichas).

ANTIKYTHIRA: Potamos, 700m W: sparse phrygana on sandy soil close to the village, (1 ♂ 3 ♀, pitfall traps 27/3/2001 – 5/8/2001, leg. Chatzaki).

KARPATOS: Pyles – Volada, 1 km E, phrygana on an earlier burnt field, (4 ♀ ♀, pitfall traps 12/5/2001 – 23/8/2001, leg. Chatzaki).

KOS: Kefalos – Ag. Ioannis, 1 km S, phrygana and adjacent pine forest, (6 ♀ ♀, pitfall traps 26/6/2001 – 9/9/2001, leg. Chatzaki).

PELOPONNISOS: Mainalo Mt., alpine phrygana (1 ♂ 2 ♀ ♀, pitfall traps 9/7/1997 – 12/10/1997, leg. Anastasiou).

Comparative material examined (vidit M. Chatzaki): *Z. labilis*: Attiki, Ekali (1 ♂, 10/5/1935, Col. Hadjissarantos, ZMUA); Samos, Koumaradaioi (1 ♀, 1/8/1937, Col. Hadjissarantos, ZMUA).

*Taxonomy.* *Z. labilis* was first described by Simon (1914) based on female specimens from the Pyrenees. Later Hadjissarantos (1940) identified one female from Samos by using the key of Simon, and one male from Attiki, which he described for the first time. We are therefore uncertain about the true identity of the species collected by Hadjissarantos and about its relationship to *Z. labilis* (sensu Simon). However, as our specimens fit the description of Hadjissarantos (see shape of tibial apophysis, terminal apophysis and median plate of the epigyne), we follow his opinion. This species shows a high variability in genital characters, as will be discussed later. A more detailed study, covering the whole range of their distribution, may prove that these different forms belong to more than one species.

Measurements ♂ (♀), n = 142 (200): TL: 2.75-5.35 (2.9-7.4), PL: 1.3-2.25 (1.3-2.25), PW: 1-1.8 (0.95-2.05), PL/PW: 1.17-1.63 (1.1-1.52).

Pedipalp ♂ (Figs 87-90, 93-96): Tibial apophysis small, conical. Tegulum oval, partly membranous, with sperm duct following its periphery. Terminal apophysis (TA) triangular, situated at the apical end of the tegulum. Position of retinaculum retrolateral, apical. Embolus small, situated dorsally to the terminal apophysis. Embolar base bulging, rounded, forming a median hole with strongly sclerotized rim (H). The shape of this hole changes when seen from different angles (compare Figs 93 and 94) and it also differs among specimens. Here we give the two extreme forms (compare dorsal view Figs 93, 95 and dorsal/prolateral view 94, 96). In specimens from the lowlands (Figs 87-88 and 93-94) the rim is rounded, with a small tip; in specimens from Lefka Ori, at altitudes above 1650m (Figs 89-90 and 95-96), it is more prominent, forming a triangular process (p). In specimens from the other mountain regions of Crete the rim has two pointed tips (Lasithi, Limnakaro plateau) or is provided with some small tips (Psiloreitis Mt.).

Epigyne (Fig. 98): Anterior margin divided, with two well-separated caps. Median plate U-shaped, often V-shaped, and longer than wide. In specimens from high altitudes the median plate is as long as wide (see Fig. 100).

Vulva (Fig. 99): Introductory channels starting at lateral sides of the median plate with a pouch, then leading through transverse ducts to globular spermathecae. Glandular heads of variable size, attached to the pouches. In specimens from high altitudes (Fig. 101) the pouches are larger and the distance between the posterior rim of the median plate and the spermathecae is greater.

*Comments.* This species presents great variability in size and in morphological characters of the genitalia. Out of 142 male and 200 female specimens examined, only 22 and 9, respectively, are considered as large (TL ♂ > 4.5mm and TL ♀ > 6mm),

while the majority are of smaller size. This large form, mostly present in the high altitudes of Crete, shows some differences in the genitalia, as mentioned above. Also specimens from Mt. Mainalo in Peloponnisos belong to a special type. As there are intermediate forms between these extremes (see also Fig. 104), we place all these specimens into one species. A further analysis of the genitalia and in a wider geographical range must be conducted, in order to achieve a better understanding of the taxonomic structure of this 'species'.

*Ecology.* *Z. labilis* is very common on Crete and surrounding islands (Fig. 123), as well as on Peloponnisos. The small lowland form occurs up to 1200m, while the large form was found from 1650m upwards. The two extremes are apparently interconnected by a zone of transition. Adults occur from spring to late autumn, with a peak of activity from late spring to early summer.

*Distribution.* France, Sicily, Greece.

***Zelotes daidalus* Chatzaki sp. n.**

Figs 91-92, 97, 102-103, 123

*Etymology:* The name is taken from Greek mythology: Daidalos was the architect of the Minoan palace of Knossos; noun in apposition, hence invariable.

*Material.* Type material: Site 27a (Exantis, leg. Chatzaki) (1 ♂ holotype, 2 ♀♀ paratypes [NHMC]); 1 ♂ 1 ♀ paratypes [MHNG]).

CRETE: CHANIA: Site 2 (a 7 ♂♂; b 3 ♂♂); Site 3 (a 2 ♀♀ [CTh]; b 1 ♂); Site 6 (f 1 ♂) (all leg. Lymberakis); Site 16 (c 1 ♂ [CTh]; d 5 ♂♂) (all leg. Paragamian); RETHYMNO: Site 39 (a 1 ♂); Site 40 (b 1 ♂); Site 41 (a 2 ♂♂) (all leg. Nikolakakis); IRAKLEIO: Site 47 (b 1 ♂) (leg. Nikolakakis); LASITHI: Site 55 (a 3 ♀♀; b 4 ♀♀) (all leg. Chatzaki); Site 63 (b 1 ♂); Site 71 (b 3 ♂♂) (all leg. Stathi).

*Taxonomy.* This species is close to *Z. labilis*. Both species have a similar habitus (*Z. daidalus* sp. n. is rather smaller), and the general structure of the epigyne is similar as well. However, *Z. daidalus* sp. n. can be easily distinguished by the shape of the tibial apophysis, the terminal apophysis and the transverse embolus. In *Z. daidalus* sp. n., the median plate of the epigyne is wider than in *Z. labilis*, the glandular heads are in a different position and the distance between posterior rim of median plate and spermathecae is greater.

Measurements ♂ (♀), n = 16 (8): TL: 3-3.7 (3.5-6), PL: 1.4-1.6 (1.4-2), PW: 1-1.25 (1.1-1.6), OL: 1-1.25 (1.8-3.5), PL/PW: 1.26-1.39 (1.2-1.4).

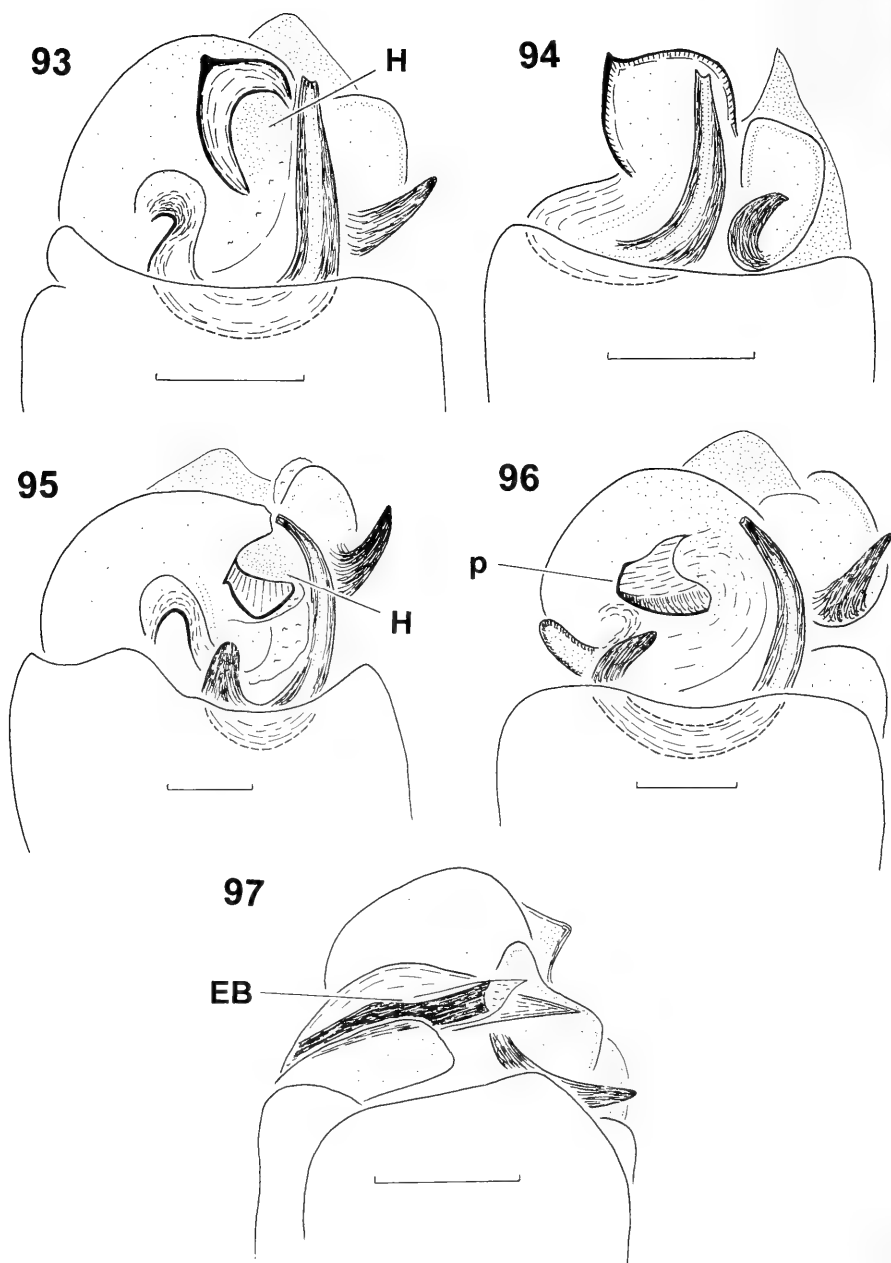
♂ ♀: Habitus as in *Zelotes labilis*. Dark brown spiders of small size. Prosoma equally wide along its whole length. Anterior and posterior rows of eyes straight.

Legs: Me III-IV with apical preening combs. All Co, Me and Ta yellow, other articles brown. All Ta and Me with spiny hairs. Spination: Fe: I-II d 0-2; III-IV d 2-3. Pa: I-IV - . Ti: I-II - ; III-IV spinose ventrally. Me: I-II - ; III-IV spinose ventrally.

♂ Pedipalp (Figs 91-92, 97): Tibial apophysis relatively short, rounded. Terminal apophysis (TA) bulging, rounded, hiding the embolus and the retinaculum, seen only from the dorsal view. Embolus short, transverse, with distinct embolar base (EB).

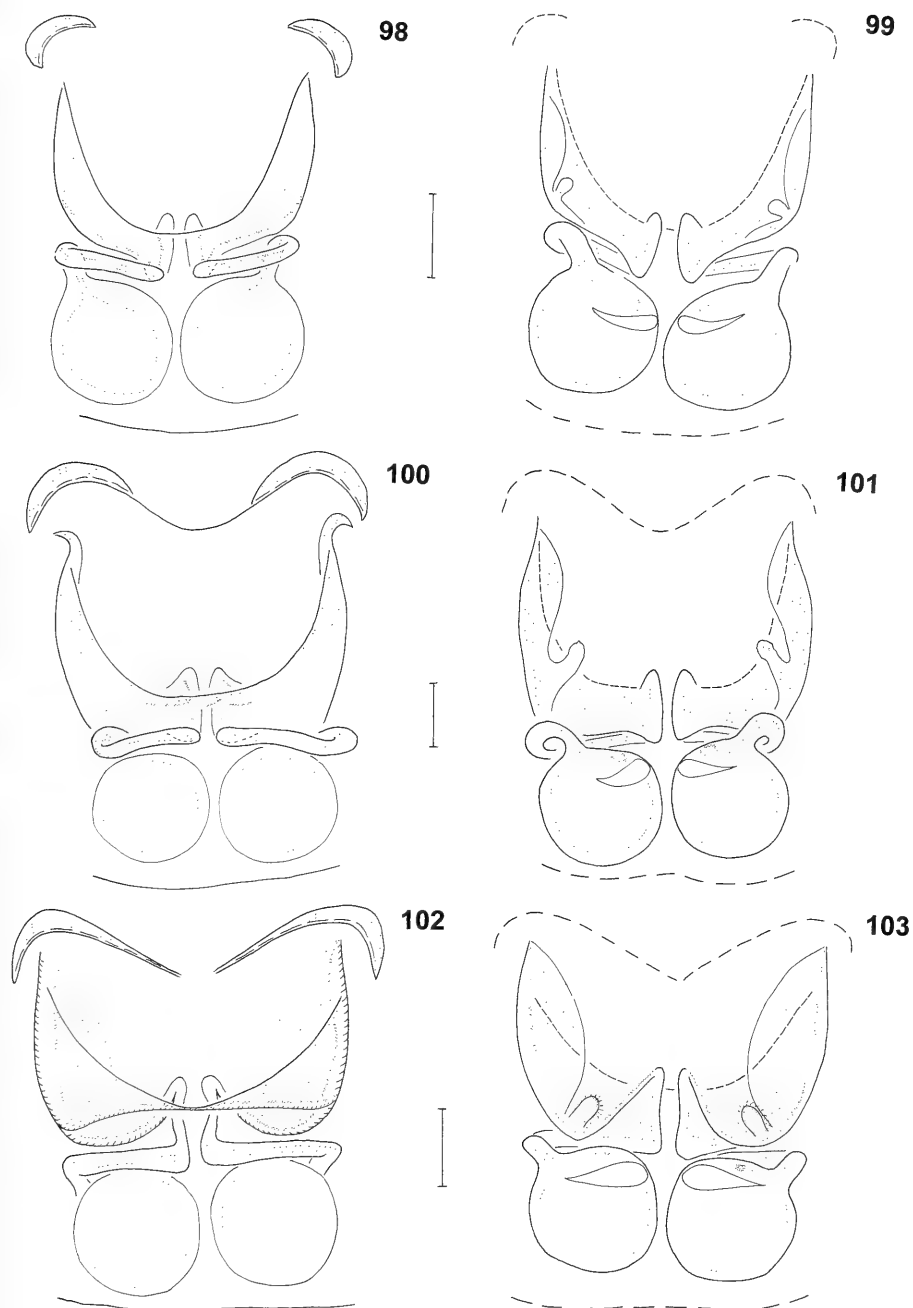
Epigyne (Fig. 102): Anterior margin wide, almost continuous. Median plate wider than long, its posterior margin broadly curved.

Vulva (Fig. 103): Introductory channels starting with pouches, glandular heads attached to posterior angles. Introductory ducts transverse, spermathecae globular, as



FIGS 93-97

*Zelotes labilis*, specimens from lowlands (93-94), specimens from high altitudes (95-96), *Z. daidalus* sp. n. (97). Palp of ♂, dorsal view (93-97). H: sclerotized rim, p: triangular process, EB: embolar base. Scale lines 0.1mm.



FIGS 98-103

*Zelotes labilis*, specimens from lowlands (98-99), specimens from high altitudes (100-101). *Z. daidalus* sp. n. (102-103). Epigyne (98, 100, 102), vulva (99, 101, 103). Scale lines 0.1mm.

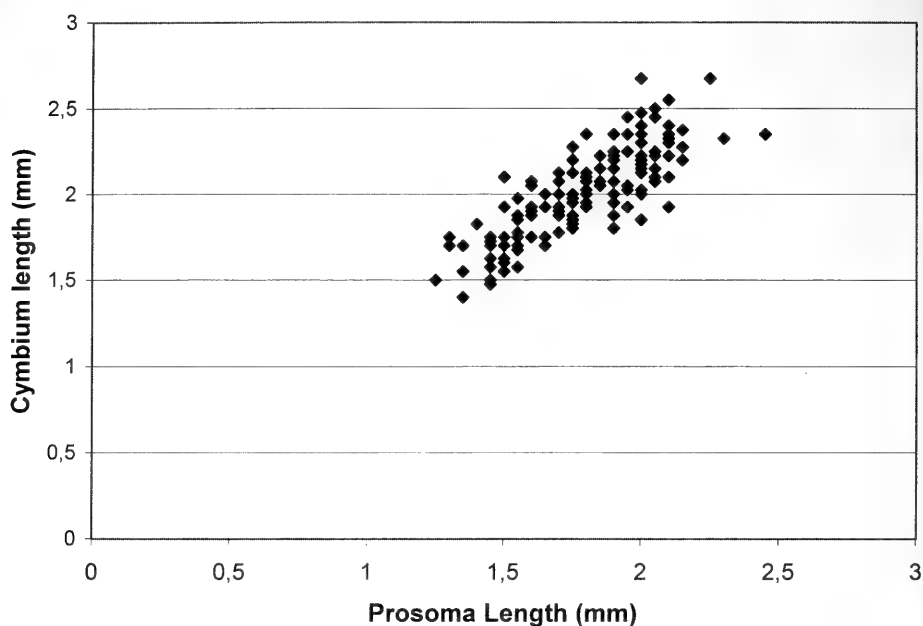


FIG. 104

Scatter diagram of ♂ *Z. labilis* morphometric measurements: cymbium / prosoma length.

in *Z. labilis*. Distance between the posterior rim of the median plate and the spermathecae greater than in *Z. labilis*.

*Ecology.* *Z. daidalus* sp. n. occurs mainly at the periphery of Crete (Fig. 123), probably indicating an immigration from other regions rather than an endogenous origin. It is not very common either on Crete or on Gavdos.

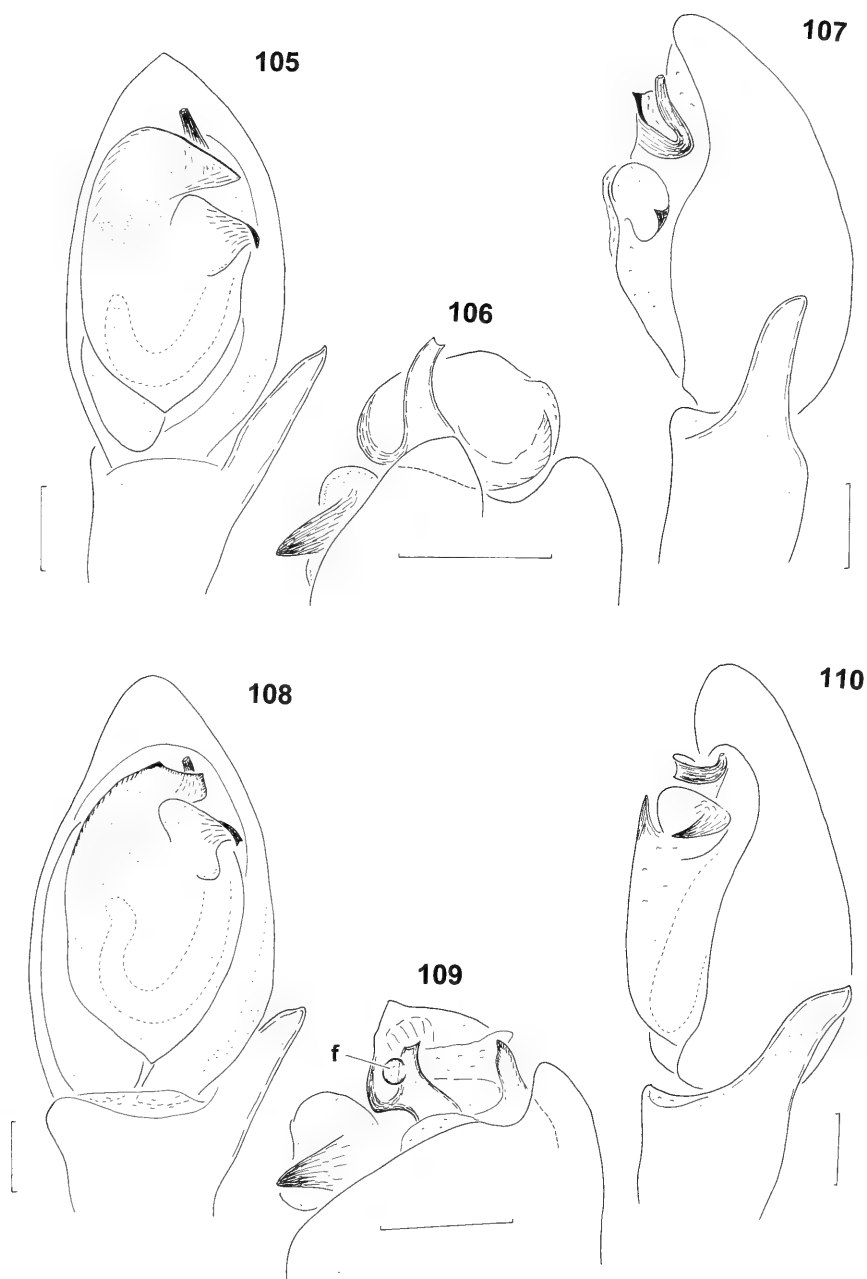
*Distribution.* Crete, Gavdos.

### *Zelotes tenuis* (L. Koch, 1866)

Figs 105-114, 124

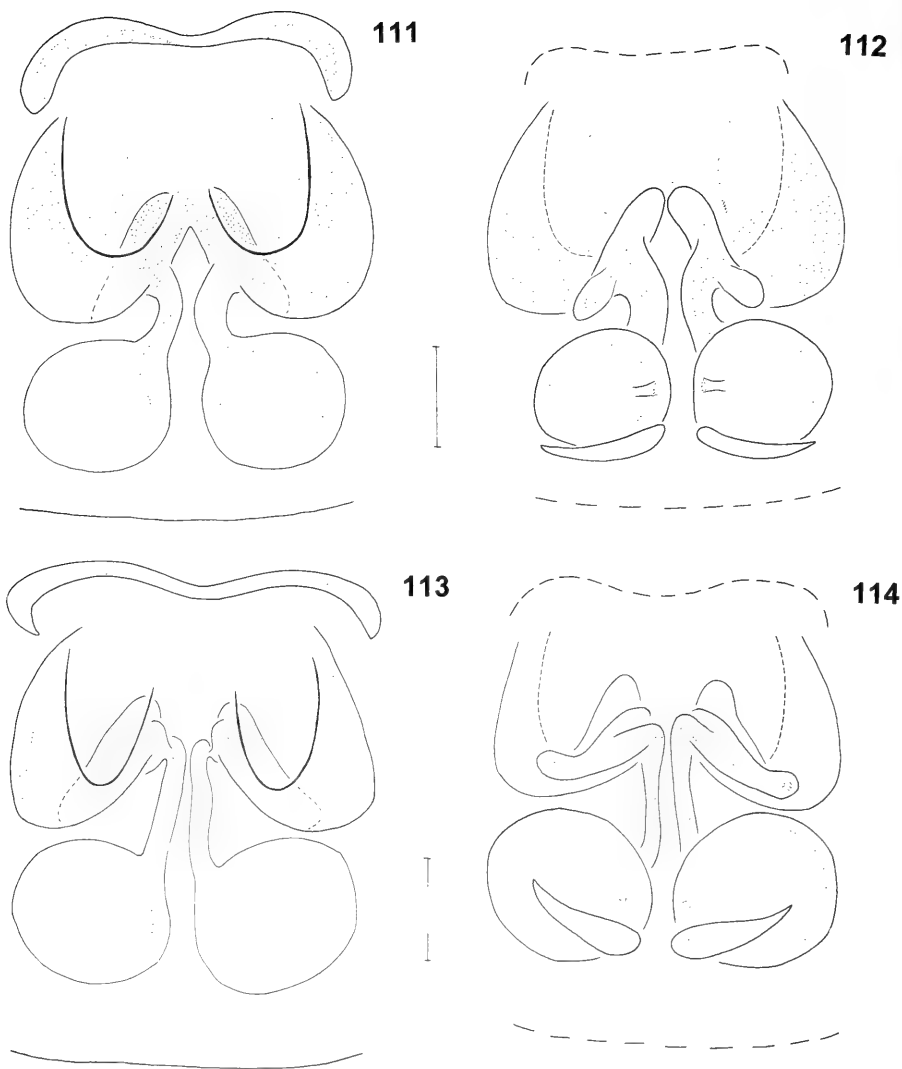
*Identification:* Levy (1998, p.131, Figs 78-81), Platnick & Shadab (1983, p.185, Figs. 259-262 [sub *Z. pallidus*, see Platnick, 1989:489]).

*Material.* CRETE: CHANIA: Site 2 (b 2 ♂♂ 1 ♀); Site 3 (a 1 ♂; b 9 ♂♂ 1 ♀; c 3 ♂♂); Site 4 (a 1 ♂; b 5 ♂♂ 11 ♀♀); Site 5 (b 25 ♂♂ 27 ♀♀; c 2 ♂♂ 1 ♀); Site 6 (e 5 ♂♂ 1 ♀; f 22 ♂♂ 4 ♀♀; g 16 ♀♀; h 3 ♀♀); Site 7 (e 1 ♂; f 2 ♀♀) (all leg. Lymberakis); Site 15 (d 2 ♂♂); Site 16 (c 3 ♂♂; d 2 ♀♀); Site 17 (c 3 ♂♂; d 2 ♂♂ 2 ♀♀); Site 18 (a 2 ♀♀; c 1 ♂; d 2 ♂♂); Site 19 (a 1 ♀; c 1 ♂; d 2 ♂♂); Site 20 (b 1 ♂); Site 21 (a 1 ♀; c 1 ♂; d 6 ♀♀); Site 22 (b 3 ♀♀) (all leg. Paragamian); RETHYMNO: Site 25 (a 3 ♂♂); Site 26 (a 6 ♂♂ 1 ♀; b 16 ♂♂ 8 ♀♀; c 1 ♀) (all leg. Lymberakis); Site 27 (a 6 ♂♂ 1 ♀; b 4 ♂♂ 19 ♀♀) (all leg. Chatzaki); Site 28 (b 13 ♂♂ 23 ♀♀); Site 29 (a 3 ♂♂; b 8 ♂♂ 6 ♀♀); Site 39 (a 2 ♂♂); Site 40 (b 35 ♂♂ 1 ♀; c 10 ♂♂ 46 ♀♀; d 3 ♀♀); Site 41 (a 1 ♂; b 5 ♂♂ 6 ♀♀) (all leg. Nikolakakis); IRAKLEIO: Site 42 (f 9 ♂♂; g 6 ♂♂ 7 ♀♀; h 7 ♀♀) (all leg. Chatzaki); Site 43 (b 2 ♂♂); Site 44 (a 2 ♂♂; b 15 ♂♂ 6 ♀♀; b 3 ♂♂ [MHNG]; c 2 ♀♀; c 2 ♀♀ [MHNG]); Site 45 (a 55 ♂♂ 8 ♀♀; b 6 ♂♂ 26 ♀♀); Site 47 (b 14 ♂♂ 7 ♀♀; c 7 ♀♀); Site 50 (e 8 ♀♀); Site 52 (a 1 ♂; b 25 ♂♂ 4 ♀♀; c 2 ♀♀) Site 54 (b 7 ♂♂ 3 ♀♀) (all leg. Nikolakakis); Site 46 (a 34 ♂♂ 20 ♀♀; b 35 ♀♀); Site 49 (a 32 ♂♂ 4 ♀♀; b 20 ♂♂ 36 ♀♀; c 5 ♀♀); Site 50 (c



FIGS 105-110

*Zelotes tenuis*, rare form (105-107), common form (108-110). Palp of ♂, ventral view (105, 108), dorsal view (106, 109), retrolateral view (107, 110). f: subterminal fringe. Scale lines 0.1mm.



Figs 111-114

*Zelotes tenuis*, rare form (111-112), common form (113-114). Epigyne (111, 113), vulva (112, 114). Scale lines 0.1mm.

35 ♂♂ 6 ♀♀; c 1 ♂ var.; d 17 ♂♂ 27 ♀♀ (all leg. Papadimitrakakis); LASITHI: Site 55 (a 2 ♂♂ 1 ♀; b 1 ♂ 4 ♀♀); Site 73 (a 5 ♂♂ 4 ♀♀; b 1 ♀) (all leg. Chatzaki); Site 58 (a 11 ♂♂ [CTH]; a 3 ♀♀; b 13 ♀♀ [CTH]); Site 62 (a 10 ♂♂ 8 ♀♀; b 24 ♀♀); Site 64 (d 10 ♂♂ 2 ♀♀; d 2 ♂♂ 3 ♀♀ var.; e 3 ♀♀); Site 65 (a 14 ♂♂ 3 ♀♀; b 2 ♀♀); Site 68 (a 7 ♂♂ 6 ♀♀; b 1 ♀) (all leg. Papadimitrakakis); Site 60 (a 2 ♂♂); Site 63 (b 6 ♂♂ 2 ♀♀; c 10 ♀♀); Site 71 (b 17 ♂♂ 8 ♀♀; c 6 ♀♀) (all leg. Stathi); Site 61 (a 3 ♂♂ 3 ♀♀; b 4 ♂♂ 1 ♀); Site 66 (a 3 ♂♂ 1 ♀); Site 67 (a 6 ♂♂ 2 ♀♀) Site 69 (a 1 ♂ 3 ♀♀); Site 70 (b 1 ♀); Site 72 (a 3 ♂♂ 1 ♀; b 7 ♂♂ 2 ♀♀) (all leg. Trichas).





FIG. 115  
*Camillina metellus*, distribution on Crete.

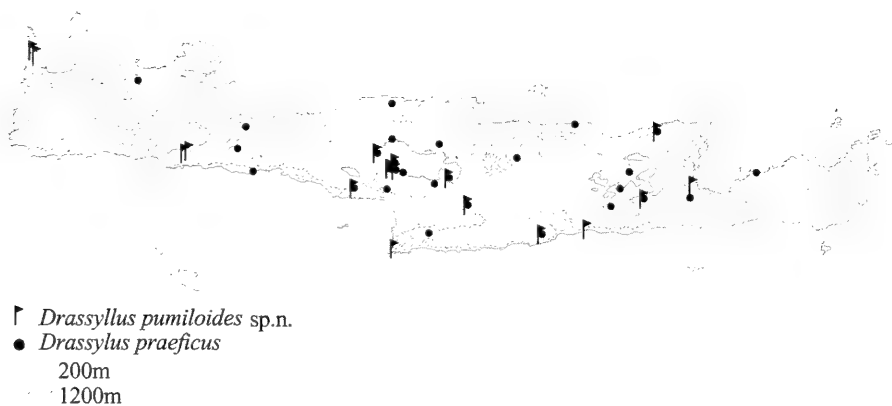


FIG. 116  
*Drassyllus praeficus*, *D. pumiloides* sp. n., distribution on Crete.

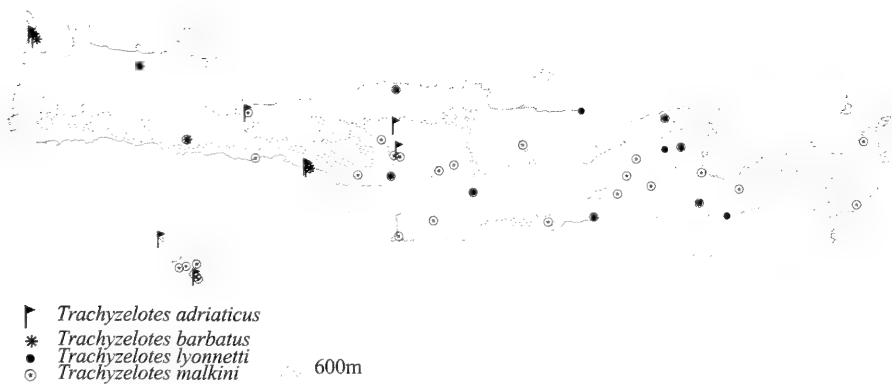


FIG. 117  
*Trachyzelotes adriaticus*, *T. barbatus*, *T. lyonnети*, *T. malkini*, distribution on Crete.



FIG. 118

*Setaphis carmeli*, *Zelotes aerosus*, *Z. solstitialis*, *Z. nilicola*, distribution on Crete.

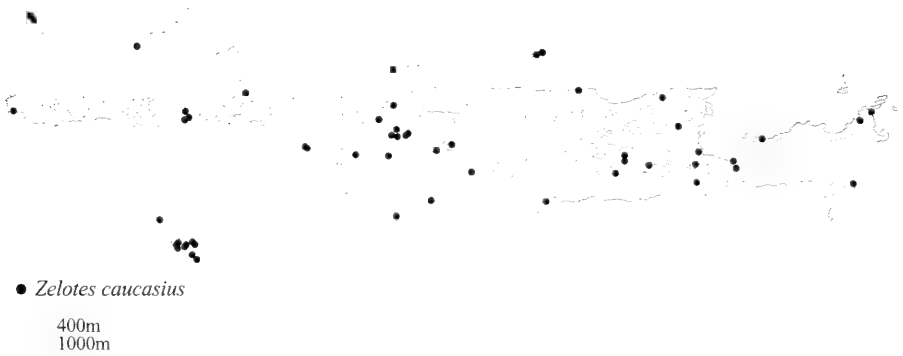


FIG. 119

*Zelotes caucasi*, distribution on Crete.

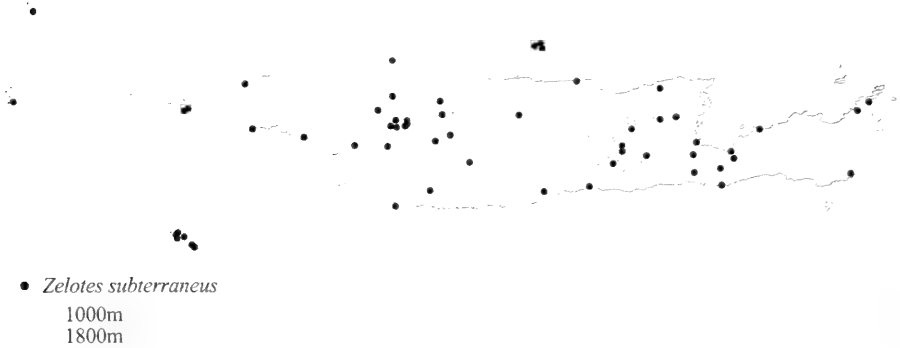


FIG. 120

*Zelotes subterraneus*, distribution on Crete.

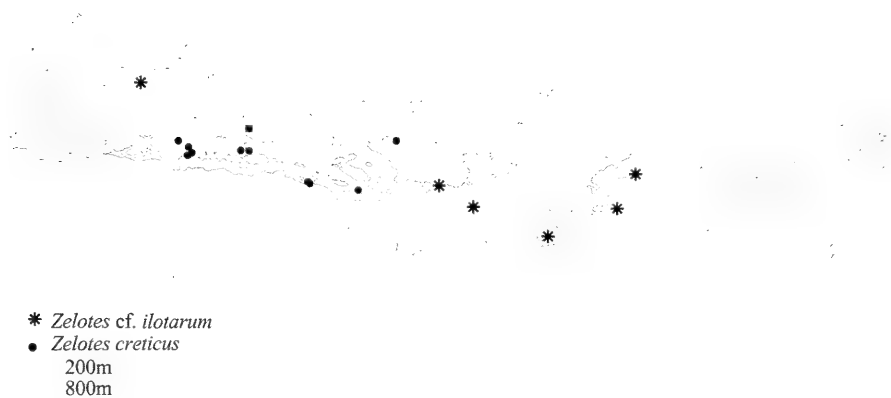


FIG. 121

*Zelotes creticus*, *Z. cf. ilotarum*, distribution on Crete.

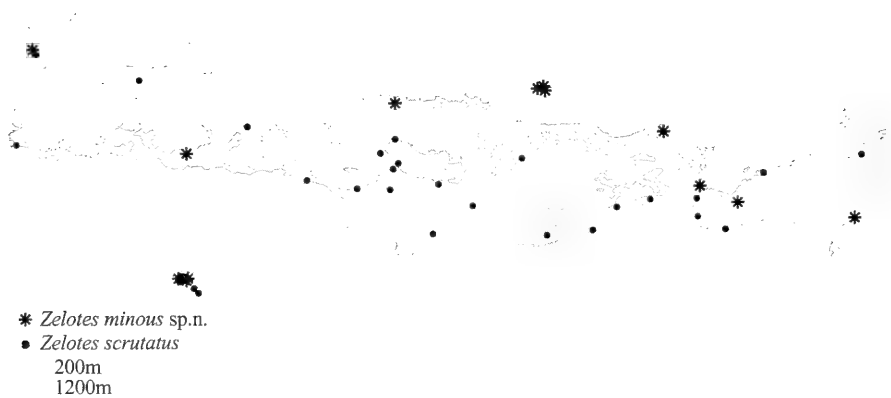


FIG. 122

*Zelotes scrutatus*, *Z. minous* sp. n., distribution on Crete.

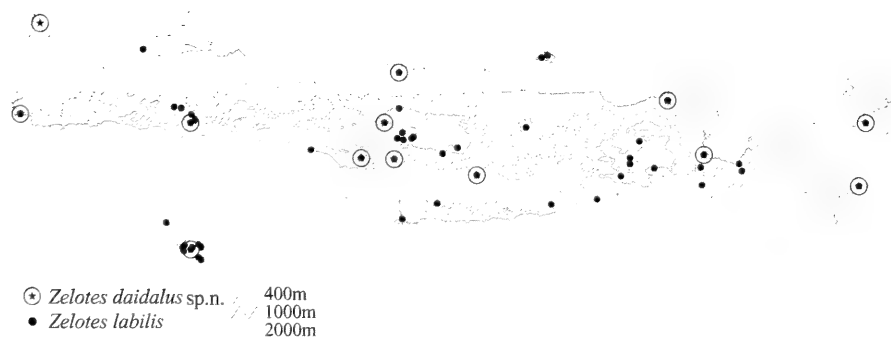


FIG. 123

*Zelotes labilis*, *Z. daidalus* sp. n., distribution on Crete.



● *Zelotes tenuis*  
400m

FIG. 124

*Zelotes tenuis*, distribution on Crete.

KARPATOS: Pyles – Volada, 1 km E, phrygana on an earlier burnt field, (14 ♂♂ 6 ♀♀, pitfall traps 12/5/2001 – 23/8/2001, leg. Chatzaki).

KOS: Kefalos – Ag. Ioannis, 1 km S, phrygana and adjacent pine forest, (21 ♂♂ 34 ♀♀, pitfall traps 26/6/2001 – 9/9/2001, leg. Chatzaki).

*Taxonomy.* Measurements ♂ (♀): n = 14 (16): TL: 3.4-7.2 (3.5-9.6), PL: 1.6-3 (1.5-3.4), PW: 1.2-2.5 (1.1-2.4), OL: 1.6-4.1 (1.6-5.7), PL/PW: 1.17-1.52 (1.19-1.47).

♂ ♀: Medium sized spiders of reddish brown colour. Posterior row of eyes straight or slightly recurved, anterior row straight or slightly procurved. PME round or oval.

Legs: Me III-IV with apical preening combs. Ta I-II with scopula hairs, III-IV with spiny hairs. Spination: Fe: I-II d 3; III-IV d 5-6. Pa: I-II, IV -; III r 1. Ti: I -; II v 0-1; III-IV spinose. Me: I v 0-2; II v 3; III-IV spinose.

♂ Pedipalp (Figs 105-110): Tibial apophysis almost straight. Cymbium oval. Embolar base broad, transverse, its end sharply turning to the dorsal side. Embolus short, dorsal, often with a subterminal fringe (f).

Epigyne (Fig. 111, 113): Anterior margin wide, continuous. Median plate divided posteriorly by a median septum, introductory orifices situated at its lateral sides.

Vulva (Fig. 112, 114): Introductory channels starting with pouches, well-separated from each other, then leading as narrow, parallel ducts to the spermathecae. Glandular heads posterior.

*Comments.* In the material collected from Crete, two forms of this species are present; a rare one (males found at Sites 50 and 68, Figs 105-107 and females found at Sites 2, 4, 5, 6, 7, 26, 27, 52, 54, Figs 111-112), and a very common one (Figs 108-110 and 113-114). In males, the two types differ in the shape of the embolar base (compare Figs 105 with 108 and 107 with 110) and in details in the embolic division (compare Figs 106 with 109). In females, differences are seen in the width of the median septum of the epigyne (compare Figs 111 with 113) and in the introductory channels (compare Figs 112 with 114). As males and females of the two types are mixed at the same localities, we cannot suggest that they belong to different species. Therefore, we place them into one species, accepting that the differences presented in male and female genitalia reflect intraspecific variation.

*Ecology.* *Z. tenuis* is very common on Crete, Gavdos and Dia, as well as on Karpathos and Kos. It is widespread in the lowlands, but does not occur above 1000m. Two peaks of activity were observed in males, one in late spring and one in early autumn; in females one in mid-summer.

*Distribution.* Mediterranean: Spain, France, Corsica, Italy, Croatia, Egypt, GREECE: Crete: Akrotiri, Kalathas Pond (Platnick & Shadab, 1983); Karpathos; Kos, introduced to the USA (Platnick & Shadab, 1983).

## CONCLUDING REMARKS

In this paper we revise the gnaphosid zelotine group of Crete and adjacent areas. In total, 20 species are reported, belonging to five genera (*Camillina*, *Drassyllus*, *Trachyzelotes*, *Setaphis* and *Zelotes*). Three species are new to science (*Drassyllus pumiloides* sp. n., *Zelotes daidalus* sp. n., and *Z. minous* sp. n.). *Camillina metellus* is a new combination for *Zelotes metellus* Roewer, 1928 and the first record of *Camillina* for Greece. *Trachyzelotes stubbsi* Platnick & Murphy, 1984 and *Zelotes bucharensis* Charitonov, 1946 are proposed as new synonyms of *T. adriaticus* (Caporiacco, 1953) and *Z. scrutatus* (O. P. Cambridge, 1872), respectively. Two species are recorded for the first time from Europe (*Z. aerosus* and *Z. solstitialis*), four are recorded for the first time from Greece (*Drassyllus praeficus*, *Trachyzelotes adriaticus*, *Setaphis carmeli* and *Z. subterraneus*) and two are recorded for the first time from Crete (*Z. labilis* and *Z. nilicola*).

Most of the species examined have a Mediterranean distribution (*T. barbatus*, *T. lyonneti*, *S. carmeli*, *Z. labilis*, *Z. subterraneus*, *Z. nilicola*) or an East Mediterranean distribution (*Z. solstitialis*), whilst few have a wider distribution (*D. praeficus*, *T. malkini*, *Z. aerosus*, *Z. scrutatus*). Apart from the newly described species, another three are still considered endemic to Greece (*C. metellus*) or endemic to Crete (*Z. creticus* and *Z. cf. ilotarum*). However, until a more thorough study of the East Mediterranean region is carried out, knowledge of the true distributions of the zelotine species cannot be considered to be precise. For example, a more detailed analysis and further material are needed to clarify the taxonomic status of the dubious species *Z. ilotarum* and *Z. labilis* on the Balkan Peninsula, the Greek islands and in Asia Minor.

Many zelotines are common on Crete, show non-specific ecological preferences and are abundant in most types of lowland habitats. *Z. caucasius*, *Z. tenuis*, *Z. labilis*, *Z. scrutatus* and *T. malkini* are among the commonest and most abundant spiders on the island. However, some species are more localized, i.e. are present either in the western part (*T. barbatus*, *T. adriaticus*, *Z. creticus*) or in the eastern part of Crete (*D. praeficus*, *T. lyonneti*, *Z. cf. ilotarum*). This may be due to either competitive interaction between congeners (as mentioned in the case of the *Trachyzelotes* group) or to different limits of tolerance to dryness, which probably makes the less tolerant species avoid the driest parts in the east of the island. The greater abundance of *D. praeficus* and *Z. creticus* recorded in the higher altitudes of Crete, indicate some preference of these species for mountainous regions, at least in the Mediterranean.

There are 11 and 6 zelotines recorded on Gavdos and Dia, respectively. These species belong to the commonest Cretan species of the group. Exceptions are *C.*

*metellus* and the new species *Z. minous* sp. n. and *Z. daidalus* sp. n. (only on Gavdos), which occur on these islands, but are not very common on Crete.

Most of the species reported here present similar phenologies, being active from spring to autumn. Males have two peaks of activity, one in late spring and one in early autumn and the females have one peak in late spring or in the mid-summer. The only exception is *Z. subterraneus*, which is more active during the autumn and the winter months.

## ACKNOWLEDGEMENTS

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## A review of the Chinese jumping spiders studied by Dr E. Schenkel (Araneae: Salticidae)

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**A review of the Chinese jumping spiders studied by Dr E. Schenkel (Araneae: Salticidae).** - 41 species of Chinese jumping spiders described by Dr E. Schenkel as new species from 1936 to 1963 are reviewed in part and listed in the present paper. 13 of these species are still valid in their original combination, 17 were placed in synonymy, 9 were before transferred, and *Menemerus yunnanensis* Schenkel, 1963 is here transferred to *Pseudicius*. Illustrations of the body of *Asianellus potanini* (Schenkel, 1963), *Heliophanus potanini* (Schenkel, 1963) and *Talavera trivittata* (Schenkel, 1963) and of diagnostic structures of *Pseudicius yunnanensis* (Schenkel, 1963), *Thiania cavaleriei* Schenkel, 1963 and *Thiania luteo-brachialis* Schenkel, 1963 are given.

**Key-words:** Araneae - Salticidae - taxonomy - China - Schenkel.

## INTRODUCTION

In recent years, due to large-scale habitat destruction and fragmentation, almost all ecosystems in China have experienced severe disturbances. Only a few isolated areas still possess their original flora and fauna. Because of this rapid habitat destruction, many species had disappeared long before they could be collected and described. One of the ways to retrieve information on species that are currently difficult to find but were once quite abundant is to examine specimens collected when their natural habitats were more intact.

Most early studies on Chinese jumping spiders were made by arachnologists from overseas. Among of them, Dr Ehrenfried Schenkel, former curator of the Natural History Museum of Basel, contributed most publications (Schenkel, 1936, 1938a, 1938b, 1953, 1963), but illustrations and other information in these papers are sometimes not sufficient for correct identification. Recently, we checked some salticid specimens studied by E. Schenkel and deposited at the Muséum d'Histoire Naturelle, Paris. Dr Ambros Haenggi (NMB) provided information on Chinese salticid specimens studied by E. Schenkel and deposited at the Naturhistorisches Museum Basel. Based on the results of our work along with work documented by other colleagues, 41 species

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of Chinese jumping spiders described as new species by E. Schenkel are reviewed and listed in the present paper. 13 of these species remain in their original combination, 17 are junior synonyms, 9 were transferred to other and *Menemerus yunnanensis* Schenkel, 1963 is here transferred to *Pseudicius*.

## MATERIAL AND METHODS

The materials used for this study are deposited in the following institutions and universities (abbreviations are used in the text):

HNU Hunan Normal University, Changsha, China

IZCAS Institute of Zoology, Chinese Academy of Sciences, Beijing, China

JLU Jilin University, Changchun, China

MHNG Muséum d'histoire naturelle, Genève, Switzerland

MNHN Muséum National d'Histoire Naturelle, Paris, France

NMB Naturhistorisches Museum Basel

For each species, only the following synonyms and references are given in the text: References to Schenkel's papers; References to relevant papers by Chinese colleagues, and synonyms not listed in Platnick's spider catalogue (Platnick, 2002).

Updated information on the distribution in China of each species is provided at the provincial level. The names of localities and distribution data are given according to current Chinese standard, as shown in Map 1.

Other abbreviations used in the text: D = Description, T = Transferred.

## TAXONOMY

### 1. *Asianellus festivus* (C. L. Koch, 1834)

*Aelurillus festivus* (C. L. Koch): Zhu & Shi, 1983: 199, figs 180a-e (♂ ♀); Chen & Zhang, 1991: 318, fig. 338 (♀).

*Phlegra pichoni* Schenkel, 1963: 438, figs 251a-b (♂); Yin & Wang, 1979: 36, figs 20A-E (♂ ♀); Hu, 1984: 383, figs 398.1-3 (♂ ♀); Chen & Gao, 1990: 191, figs 244a-b (♂ ♀, misidentified).

*Phlegra festiva* (C. L. Koch): Harm, 1977: 69, figs 2a-b, 10-12, 14a-b (T♂ ♀ from *Aelurillus*, rejected); Weiss, 1979: 246, figs 21-25 (♂ ♀); Zhang, 1987: 249, figs 221.1-4 (♂ ♀); Peng *et al.*, 1993: 168, figs 590-597 (♂ ♀); Song, Chen & Zhu, 1997: 1739, figs 51a-b (♀).

*Asianellus festivus* (C. L. Koch): Logunov & Heciak, 1996: 106, figs 1-5, 8, 10, 17-19, 23-28, 39 (T♂ ♀ from *Phlegra*); Song, Zhu & Chen, 1999: 505, figs 288M-O, 289B-C (♂ ♀).

Material examined: 1♂ (holotype of *Phlegra pichoni* Schenkel, 1963), Hangzhou City, Zhejiang Province, 1925 (MNHN); 6♂♂5♀♀, Laishui District, Hebei Province, 12-13.V.2001, leg. X. J. Peng (MHNG); 1♂, Zhangjiatie City, Hunan Province, 25.VIII.1984, leg. Y. J. Zhang (HNU); 1♀, Mt. Yuelu, Changsha City, Hunan Province, 24.VI.1986, leg. L. P. Xie (HNU); 1♀, Fuping District, Shaanxi Province, 25.VII.1998, leg. J. Chen (IZCAS); 1♀, Bikou Township, Wenxin District, Gansu Province, 25.VI.1998, leg. J. Chen (IZCAS).

Distribution. China (Anhui, Beijing, Gansu, Guangxi, Guizhou, Hebei, Heilongjiang, Hubei, Hunan, Jilin, Shaanxi, Shandong, Shanxi, Sichuan, Zhejiang), Palearctic Region.

### 2. *Asianellus potanini* (Schenkel, 1963)

Fig. 1

*Phlegra potanini* Schenkel, 1963: 436, figs 250a-b (♂); Wesolowska, 1981b: 153, figs 72-76 (♂); Prószyński, 1990: 283 (T♂ ♀ from *Aelurillus*).



MAP 1. Political map of China (source: <http://nfgis.nsd.gov.cn>).

*Asianellus potanini* (Schenkel): Logunov & Heciak, 1996: 113, figs 7, 12, 31-32, 36, 49-56 (T♂ ♀ from *Phlegra*); Song, Zhu & Chen, 1999: 506, figs 288P-Q, 289D (♂ ♀).

Material examined: 1♂ (holotype of *Phlegra potanini*), collection data missing (according to Schenkel, 1963: possibly in "Kloster Dschoni, Kansu", 24 V. ...label missing) (MNHNP).

Distribution. Kazakhstan to China (Gansu).

### 3. *Bianor hotingchiehi* Schenkel, 1963

*Bianor hotingchiehi* Schenkel, 1963: 434, figs 249a-f (♂); Yin & Wang, 1979: 27, figs 1A-E (♂ ♀); Yin & Wang, 1981: 268, figs 1A-H (♂ ♀); Hu, 1984: 354, figs 368.1-5 (♂ ♀); Song, 1987: 286, fig. 243 (♂ ♀); Feng, 1990: 198, figs 173.1-6 (♂ ♀); Chen & Gao, 1990: 180, figs 229a-c (♂ ♀); Chen & Zhang, 1991: 288, figs 301.1-5, 302.1-6 (♂ ♀); Song, Zhu & Li, 1993: 883, figs 58A-D (♂ ♀); Peng *et al.*, 1993: 26, figs 34-42 (♂ ♀); Zhao, 1993: 391, figs 195a-c (♂ ♀); Song, Zhu & Chen, 1999: 506, figs 289J, 290A, 324M (♂ ♀).

Material examined: 1♂2♀, Xiangyin District, Hunan Province, XI.1980, leg. Z. Q. Hu (HNU); 1♂, Mt. Longqi, Jiangle District, Fujian Province, 19.VIII.1991 (MHNG); 1♀, Mt. Tianmu, Zhejiang Province, 5.IX.1989 (MHNG); 1♂, Cili District, Hunan Province, VII.1986, leg. X. J. Peng (HNU); 1♀, Xiangyin District, Hunan Province, X.1986, leg. X. J. Peng (HNU).

Distribution. China (Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shandong, Sichuan, Yunnan, Zhejiang), Bangladesh, Myanmar, Vietnam.

#### 4. *Carrhotus xanthogramma* (Latreille, 1819)

*Carrhotus xanthogramma* (Latreille): Lessert, 1910: 592; Prószyński, 1973b: 100, figs 8-14 (♂ ♀); Guo, 1985: 175, figs 2-99.1-4 (♂ ♀); Song, 1987: 287, figs 244 (♂ ♀); Zhang, 1987: 236, figs 207.1-4 (♂ ♀); Chen & Gao, 1990: 181, figs 230a-c (♂ ♀); Chen & Zhang, 1991: 295, figs 310.1-3 (♂ ♀); Peng *et al.*, 1993: 38, figs 84-91 (♂ ♀); Zhao, 1993: 392, figs 196a-c (♂ ♀); Song, Zhu & Chen, 1999: 507, figs 290K, 291C (♂ ♀).

*Carrhotus pichoni* Schenkel, 1963: 444, figs 254a-c (♂); Yin & Wang, 1979: 28, figs 3A-E (♂ ♀); Yin & Wang, 1981: 269, figs 2A-F (♂ ♀); Hu, 1984: 356, figs 370.1-4 (♂ ♀).

*Carrhotus bicolor* (Walckenaer): Peng, 1989: 158, figs 2A-F (♂ ♀).

Material examined: 1 ♂, (paratype of *Carrhotus pichoni*), Zhejiang Province (on locality label: Hangtscheu Tschekiang), leg. Dr Pichon, 1925 (NMB2162a); 1 ♂ 1 ♀, Dadou District, Guangxi Zhuang Autonomous Region, alt. 280m, 29.III.1988, leg. M. Wu (MHNG); 1 ♀, Daxin District, Guangxi Zhuang Autonomous Region, alt. 280m, 30.III.1988, leg. M. Wu (MHNG); 1 ♀, Nanping, Shangsi District, Guangxi Zhuang Autonomous Region, alt. 350m, 11.VI.2000, leg. J. Yao (MHNG); 1 ♂, Xiailei Town, Daxin District, Guangxi Zhuang Autonomous Region, alt. 320m, 31.III.1998, leg. M. Wu (MHNG); 1 ♀, Dongzhong Town, Fangchenggang City, Guangxi Zhuang Autonomous Region, alt. 270m, 5.IV.1998, leg. J. Chen (MHNG); 1 ♀, Yaogou, Fuping District, Shaanxi Provinces, alt. 870-1000m, 25.VII.1998, J. Chen (IZCAS).

Distribution. China (Fujian, Guizhou, Guangdong, Guangxi, Hunan, Hubei, Jilin, Liaoning, Shaanxi, Shandong, Sichuan, Taiwan, Zhejiang), Palearctic Region.

#### 5. *Davidina magnidens* (Schenkel, 1963)

*Davidia magnidens* Schenkel, 1963: 465, figs 263a-f (♀).

No specimens examined.

Distribution. China (Zhejiang).

Remarks: This species was described by Schenkel (1963) from an immature specimen, which could not be found in the MNHNP.

#### 6. *Evarcha albaria* (L. Koch, 1878)

*Evarcha albaria* (L. Koch): Simon, 1903: 697, figs 837 (♂); Schenkel, 1963: 459, figs 260a-c (♂ ♀); Yin & Wang, 1979: 30, figs 6A-C (♂ ♀); Wang, 1981: 137, figs 77A-C (♂ ♀); Hu, 1984: 361, figs 376.1-4 (♂ ♀); Guo, 1985: 176, figs 2-100.1-4 (♂ ♀); Zhu & Shi, 1983: 212, figs 184a-d (♂ ♀); Song, 1987: 290, figs 246 (♂ ♀); Zhang, 1987: 238, figs 209.1-4 (♂ ♀); Feng, 1990: 199, figs 174.1-6 (♂ ♀); Chen & Gao, 1990: 183, figs 232a-b (♂ ♀); Chen & Zhang, 1991: 312, figs 331.1-4 (♂ ♀); Song, Zhu & Li, 1993: 884, figs 59A-D (♂ ♀); Peng *et al.*, 1993: 61, figs 159-165 (♂ ♀); Zhao, 1993: 395, figs 198a-c (♂ ♀); Song, Chen & Zhu, 1997: 1734, figs 44a-d (♂ ♀); Song, Zhu & Chen, 1999: 509, figs 292P-Q, 294B-C (♂ ♀).

*Evarcha pichoni* Schenkel, 1963: 459, figs 261a-b (♂).

Material examined: 1 ♂ (holotype of *Evarcha pichoni* Schenkel, 1963), Hangzhou City, Zhejiang Province, 1925 (MNHNP); 1 ♂ 5 ♀ ♀, Miaotaizi Town, Liuba District, Shaanxi Province, alt. 1350-1730m, 21.VII.1998, leg. J. Chen (MHNG); 1 ♀, Yaogou, Fuping District, Shaanxi Provinces, alt. 870-1000m, 25.VII.1998 (MHNG); 1 ♀, Kangxian District, Gansu Province, alt. 1400-1680m, 15.VII.1998, leg. J. Chen (MHNG); 2 ♂ ♂, Bifenggou, Bikou Town, Wenxian District, Gansu Province, alt. 900-1500m, 25.VI.1998, leg. J. Chen (MHNG); 1 ♂, Kangxian District, Gansu Province, alt. 1470-1610m, 13.VII.1998, leg. H. J. Wang (MHNG); 1 ♂ 1 ♀, Mt. Baiyun, Kangxian District, Gansu Province, alt. 1250-1750m, 12.VII.1998, leg. J.

Chen (MHNG); 1 ♀, Mt. Baiyun, Kangxian District, Gansu Province, alt. 1300-1750m, 12.VII.1998, leg. J. Chen (MHNG); 12 ♂ 16 ♀, Cili District, Hunan Province, 27.VII.1986, leg. X. J. Peng (HNU); 1 ♀, Hangzhou City, Zhejiang Province (on locality label: Hangtscheu Tschekiang), leg. Dr Pichon, 1925 (NMB2162a).

Distribution. China (Anhui, Gansu, Hubei, Hebei, Henan, Hunan, Fujian, Guangdong, Guangxi, Jiangsu, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Yunnan, Zhejiang), Russia, Korea, Japan.

### 7. *Hasarina contortospinosa* Schenkel, 1963

*Hasarina contortospinosa* Schenkel, 1963: 462, figs 262a-g (♂); Wesolowska, 1981b: 132, figs 10-13 (♂); Xiao, 1991: 383, figs 1-4 (♀); Peng *et al.*, 1993: 83, figs 254-263 (♂ ♀); Song, Zhu & Chen, 1999: 513, figs 299F, M (♂ ♀).

Material examined: 1 ♀, Xuanen District, Hubei Province, 24.V.1989 (MHNG).

Distribution. China (Fujian, Gansu, Hubei, Hunan, Sichuan).

### 8. *Heliophanus curvidens* (O. P.-Cambridge, 1872)

*Heliophanus berlandi* Schenkel, 1963: 399, figs 229a-c (♂ ♀; preoccupied by *H. berlandi* Lawrence, 1937); Prószyński & Zochowska, 1981: 18, figs 7-11 (♂ ♀); Song, Zhu & Chen, 1999: 513, figs 299P-R, 300B-C (♂ ♀).

*Heliophanus curvidens* (O. P.-Cambridge): Simon, 1876: 165; Song, Zhu & Chen, 1999: 514, figs 300D-E, J-L (♂ ♀).

Material examined: 1 ♂ (holotype of *Heliophanus berlandi*), collection data missing (according to Schenkel, 1963: "Lau-wa-sja (Louwacheng) am Siningho", Gansu, 19.IV.1885) (MNHNP); 1 ♂ (paratype of *Heliophanus berlandi*), Gansu Province (locality given on label: "Chautschuan a. Siningho"), leg. Potanin, 22.IV.1885 (NMB2176a).

Distribution. Israel to China (Gansu, Xinjiang).

### 9. *Heliophanus potanini* Schenkel, 1963

Figs 2-3

*Heliophanus potanini* Schenkel, 1963: 397, figs 228a-b (♂ ♀); Zhou & Song, 1988: 3, figs 4a-e (♂ ♀); Hu & Wu, 1989: 373, figs 282.4-7 (♂ ♀); Song, Zhu & Chen, 1999: 514, figs 300R-S, 301A (♂ ♀).

*Menemerus fagei* Schenkel, 1963: 422, figs 242a-f (♀).

Material examined: 1 ♀ (holotype of *Menemerus fagei*, epigynum missing), collection data missing (according to Schenkel, 1963: "Zwischen Tschintasy und Suwanko, Su, Suchow", 1.-5.VI. 1886) (MNHNP); 1 ♀ (paratype of *Heliophanus potanini*), Inner Mongolia (locality given on label: "Grenze Chara-Sucha, Etsin-Gol"), leg. Dr Potanin 23.-29.VII.1886 (NMB2180a); 2 ♂ 1 ♀, Bohu District, Xinjiang Uygur Autonomous Region, 20.V.1985, leg. N.L. Zhou (IZ-CAS).

Distribution. China (Inner Mongolia, Jiangsu, Xinjiang, Zhejiang), Afghanistan, Central Asia, Mongolia.

### 10. *Mendoza canestrinii* (Ninni, 1868)

*Mithion pichoni* Schenkel, 1963: 414, figs 238a-b (♂).

*Mithion tschekiangensis* Schenkel, 1963: 418, figs 240a-f (♀).

*Marpissa obscura* Kroneberg, 1875: 46, pl. 5, fig. 33 (♂ ♀); Song, Zhu & Chen, 1999: 533, figs 302P, 303G (♂ ♀).

*Marpissa magister* Prószyński, 1973b: 116; 1976: 155, fig. 251, 258 (T ♂ ♀ from *Mithion* = *Thylene*); Yin & Wang, 1979: 33, figs 14A-D (♂ ♀); Song, 1980: 205, figs 114a-f (♂ ♀); Hu, 1984: 372, figs 389.1-4 (♂ ♀); Guo, 1985: 180, figs 2-103.1-3 (♂ ♀); Zhu & Shi, 1983: 205, figs 187a-e (♂ ♀); Song, 1987: 296, figs 252 (♂ ♀); Zhang, 1987: 241, figs

213.1-4 (♂ ♀); Feng, 1990: 208, figs 183.1-6 (♂ ♀); Chen & Gao, 1990: 185, figs 235a-b (♂ ♀); Chen & Zhang, 1991: 307, figs 326.1-5 (♂ ♀); Peng *et al.*, 1993: 118, figs 394-402 (♂ ♀); Zhao, 1993: 405, figs 206a-c (♂ ♀); Song, Zhu & Chen, 1999: 533, figs 302N, 303E (♂ ♀).

*Mendoza canestrinii* (Ninni): Logunov, 1999: 49, figs 14-15, 24-25, 29, 37, 39, 44, 78-79, 98-104, 107-108, 114, 119, 123-124, 131-132.

Material examined: 1 ♀ (holotype of *Mithion tschekiangensis*), Zhejiang Province (locality given on label: W. Tschekiang) (MNHNP); 1 ♂ (paratype of *Mithion pichoni*), Hangzhou City, Zhejiang Province (locality on label: Hangtscheu, Tschekiang), leg. A. Pichon, 1925 (NMB2194a); 2 ♂ ♂, Xinguo District, Jiangxi Province, VIII.1979, leg. C. M. Yin (HNU); 7 ♂ ♂ 5 ♀ ♀, Guizhou Province, 1979, leg. J. Li (HNU); 4 ♂ ♂ 2 ♀ ♀, Chongan District, Fujian Province, VII.1986, leg. X. Q. Xiao (HNU); 4 ♂ ♂, Suining District, Hunan Province, VIII.1984, M. Y. Liu (HNU); 1 ♂, Yangjiang District, Guangdong Province, 16.V.1976, leg. W. N. Wu (MHNG); 1 ♂, Leishan District, Guizhou Province, 27.VI. 1988 (IZCAS).

Distribution. China (Anhui, Beijing, Fujian, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hunan, Hubei, Jiangsu, Jilin, Shaanxi, Shandong, Shanxi, Sichuan, Zhejiang), North Africa, Palearctic Region.

### 11. *Mendoza elongata* (Karsch, 1879)

*Mithion hotingchiehi* Schenkel, 1963: 416, figs 239a-e (♂).

*Marpissa elongata* (Karsch): Prószyński, 1973b: 114, figs 47-50 (♂); Yin & Wang, 1979: 34, figs 15A-B (♂); Hu, 1984: 372, figs 388.1-8 (♂ ♀); Guo, 1985: 178, figs 2-102.1-4 (♂ ♀); Feng, 1990: 207, figs 182.1-4 (♂ ♀); Chen & Zhang, 1991: 306, figs 325.1-3 (♂ ♀); Peng *et al.*, 1993: 116, figs 387-393 (♂ ♀); Zhao, 1993: 403, figs 205a-c (♂ ♀); Song, Zhu & Chen, 1999: 533, figs 302M, 303D, 327C-D (♂ ♀).

*Mendoza elongata* (Karsch): Logunov, 1999: 53, figs 45, 122 (T ♂ ♀ from *Marpissa*).

Material examined: 1 ♂, Bikou town, Wenxian District, Gansu Province, alt. 7000m, 24.VI. 1998, leg. J. Chen (MHNG); 1 ♂, Mt. Baiyun, Kangxian District, Gansu Province, alt. 1300-1750m, 12.VII.1998, leg. J. Chen (MHNG); 2 ♂ ♂ 3 ♀ ♀, Sangang, Chongan District, Fujian Province, VII.1986, leg. X. J. Peng (HNU); 1 ♀, Shangping Town, Hefeng District, Hubei Province, 30.V.1989 (IZCAS).

Distribution. China (Beijing, Fujian, Gansu, Guizhou, Heilongjiang, Hubei, Hunan, Jiangsu, Shaanxi, Shanxi, Sichuan, Taiwan, Zhejiang), Russia, Korea, Japan.

### 12. *Menemerus bivittatus* (Dufour, 1831)

*Menemerus bonneti* Schenkel, 1963: 430, figs 248a-e (♂). Peng *et al.*, 1993: 125, figs 418-421 (♂); Song, Zhu & Chen, 1999: 534, fig. 303K (♂).

*Menemerus bivittatus* (Dufour): Peckham & Peckham, 1886: 292; Zabka, 1985: 240, figs 283-292 (♂ ♀); Peng *et al.*, 1998: 37, figs 1-3 (♀).

Material examined: 1 ♂ (holotype of *Menemerus bonneti* Schenkel, 1963), collection data missing (according to Schenkel, 1963: Vinh, 7.III.1925) (MNHNP); 1 ♀, Goulufeng, Hengyang City, Hunan Province, 2.VIII.1997, leg. X. J. Peng (HNU); 1 ♂, Haikou City, Hainan Province, X.1980, leg. Z. Q. Feng (HNU); 2 ♂ ♂, Mengla District, Yunnan Province, VII.1983, leg. J. F. Wang (HNU); 1 ♂ 1 ♀, Tianchi, Jiangfeng Rain Forest, Hainan Province, XII.1989 (MHNG); 5 ♂ ♂, Jiangfeng Rain Forest, Hainan Province, 20.V.1990 (IZCAS).

Distribution. China (Guangdong, Hainan, Hunan, Yunnan), pantropical distribution.

### 13. *Menemerus fulvus* (L. Koch, 1878)

*Menemerus sinensis* Schenkel, 1963: 427, figs 246a-b (♀).

*Menemerus schensiensis* Schenkel, 1963: 429, figs 247a-d (♀).

*Menemerus confusus* Bösenberg & Strand, 1906: 350, pl. 9, fig. 146, pl. 14, fig. 370 (♂ ♀); Yin & Wang, 1979: 35, figs 17A-D (♂ ♀); Hu, 1984: 376, figs 392.1-2 (♂ ♀); Guo, 1985: 181, figs 2-104.1-3 (♂ ♀); Song, 1987: 297, figs 253 (♂ ♀); Zhang, 1987: 242, figs 214.1-5 (♂ ♀); Feng, 1990: 209, figs 184.1-6 (♂ ♀); Chen & Gao, 1990: 186, figs 236a-b (♂ ♀); Chen & Zhang, 1991: 308, figs 327.1-3 (♂ ♀); Zhao, 1993: 406, figs 207a-c (♂ ♀).

*Menemerus fulvus* (L. Koch): Prószyński, 1987: 155 (T ♂ ♀ from *Hasarius*).

Material examined: 1 ♀ (holotype of *Menemerus schensiensis*), Zhejiang Province (locality given on label: W. Tschekiang) (MNHNP); 1 ♀ (paratype of *Menemerus schensiensis*, epigynum missing), Hanzhou, Zhejiang Province (locality given on label: Hantschongfu) (MNHNP); 1 ♀ (paratype of *sinensis*), Nanjing City, Jiangsu Province (locality on label: Nan King), leg. G. de Joannis, 1908 (NMB2187a); 2 ♀ ♀ (paratypes of *Menemerus sinensis* Schenkel 1963, one specimen without epigynum), Nanjing, Jiangsu Province, 1908 (locality given on label: Nan Kin) (MNHNP); 7 ♂ ♂ 7 ♀ ♀, Changsha City, Hunan Province, VIII.1986, leg. X. J. Peng (HNU); 4 ♀ ♀, Shangrao City, Jiangxi Province, VI.1987, leg. X. J. Xie (HNU); 3 ♂ ♂ 3 ♀ ♀, Xichang City, Sichuan Province, X.1975 (HNU); 3 ♀ ♀, Jiangfeng Rain Forest, Hainan Province, 20.V.1990 (MHNG).

Distribution. China (Anhui, Beijing, Fujian, Guangxi, Guizhou, Hainan, Hebei, Hunan, Hubei, Jiangsu, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang), India to Japan.

#### 14. *Menemerus legendrei* Schenkel, 1963

*Menemerus legendrei* Schenkel, 1963: 423, figs 243a-e (♀).

No specimens examined.

Distribution. China (Yunnan).

#### 15. *Menemerus wuchangensis* Schenkel, 1963

*Menemerus wuchangensis* Schenkel, 1963: 424, figs 245a-e (♀).

No specimens examined.

Distribution. China (Hubei).

#### 16. *Myrmarachne schenkeli* Peng & Li, 2002

*Myrmarachne lesserti* Schenkel, 1963: 391, figs 226a-b (preoccupied by *M. lesserti* Lawrence, 1938, ♂); Song, Zhu & Chen, 1999: 535, figs 305D, N (♂, ♀ mislabeled).

*Myrmarachne schenkeli* Peng & Li, 2002: 139.

No specimens examined.

Distribution. China (Hong Kong) (?)

Remarks: This species was described from one male collected at "Castle Peak". But it is not clear whether "Castle Peak" is in China (Hong Kong) or in USA (California) (Schenkel, 1963).

#### 17. *Pellenes denisi* Schenkel, 1963

*Pellenes denisi* Schenkel, 1963: 440, figs 252a-b (♀); Wesolowska, 1981b: 151, figs 68-69 (♀); Logunov, Marusik & Rakov, 1999: 122.

*Pellenese albomaculatus* Peng & Xie, 1993: 80, figs 1-4 (♀); Song, Zhu & Chen, 1999: 537, figs 306F-G, 327Q (♀).

Material examined: 1 ♀ (holotype of *Pellenes denisi*, epigynum missing), collection data missing (according to Schenkel, 1963: "Etsingol oberhalb Kau-taeh", Innere Mongolei, 20.VI.1886) (MNHNP); 1 ♀, Qinshui District, Gansu Province, VII.1986, leg. H. Bei (HNU);

2♀, Bohu, Xinjiang Uygur Autonomous Region, 2.V.1982, leg. C. D. Zhu (JLU).

Distribution. China (Gansu, Inner Mongolia, Xinjiang), Tajikistan.

### 18. *Pellenes gobiensis* Schenkel, 1936

*Pellenes gobiensis* Schenkel, 1936: 307, fig. 108 (♀); Wesolowska, 1981b: 152, figs 70-71 (♀); Logunov, 1992: 60, figs 5a-h (♂ ♀); Song, Zhu & Chen, 1999: 537, figs 306H-J, 307A (♂ ♀).

No specimens examined.

Distribution. China (Inner Mongolia), Russia, Mongolia.

### 19. *Phintella arenicolor* (Grube, 1861)

*Jotus difficilis* Bösenberg & Strand, 1906: 336, pl. 14, fig. 379 (♀); Yin & Wang, 1979: 31, figs 11A-D (♂ ♀); Hu, 1984: 369, figs 384.1-4 (♂ ♀).

*Dexippus lesserti* Schenkel, 1963: 451, f. 257a-k (♂ ♀).

*Phintella melloteei* (Simon): Prószyński, 1983b: 6, fig. 14 (T♂ ♀ from *Telamonia*); Song, 1987: 294, fig. 250 (♀); Feng, 1990: 204, figs 179.1-6 (♂ ♀) Chen & Gao, 1990: 190, figs 242a-b (♂ ♀); Chen & Zhang, 1991: 293, figs 308.1-2 (♀); Peng *et al.*, 1993: 156, figs 540-547 (♂ ♀); Zhao, 1993: 414, figs 214a-c (♂ ♀); Song, Chen & Zhu, 1997: 1737, figs 49a-c (♂).

*Phintella arenicolor* (Grube): Logunov & Wesolowska, 1992: 135, figs 24A-C, 25A-B, 26A-C, 27A, C, E (removed ♂ from *P. castriesiana*, contra Prószyński, 1979: 310, sub *Icius*); Song, Zhu & Chen, 1999: 538, figs 307J, 308A-B (♂ ♀).

Material examined: 1♀, Dongzhong Town, Fangchenggang City, Guangxi Zhuang Autonomous Region, alt. 270m, 5.IV.1998, leg. J. Chen (MHNG); 1♀, Xuanen District, Hubei Province, 24.V.1989 (IZCAS).

Distribution. China (Beijing, Gansu, Hubei, Hunan, Jilin, Shanxi, Yunnan, Zhejiang), Russia, Korea, Japan.

### 20. *Phintella cavaleriei* (Schenkel, 1963)

*Dexippus cavaleriei* Schenkel, 1963: 454, figs 258a-e (♀).

*Icius cavaleriei* (Schenkel): Wesolowska, 1981b: 134, figs 18-21 (T♀ from *Dexippus*); Song, Yu & Yang, 1982: 210, figs 8-12 (♀); Hu, 1984: 366, figs 382.6-10 (♂ ♀).

*Phintella cavaleriei* (Schenkel): Prószyński, 1983b: 6 (T♀ from *Icius*); Song, 1987: 293, figs 249 (♂ ♀); Feng, 1990: 201, figs 176.1-4 (♂); Chen & Gao, 1990: 189, figs 241a-b (♂ ♀); Chen & Zhang, 1991: 293, figs 307.1-4 (♂ ♀); Peng *et al.*, 1993: 154, figs 532-539 (♂ ♀); Song, Chen & Zhu, 1997: 1736, figs 48a-c (♀); Song, Zhu & Chen, 1999: 538, figs 307M, 308E-F, 328C (♂ ♀).

Material examined: 1♀, Bifenggou, Bikou Town, Wenxian District, Gansu Province, alt. 900-1500m, 25.VI.1998, leg. J. Chen (MHNG); 1♀, Badong District, Hubei Province, 22.V.1989 (MHNG). 2♂♂ 5♀♀, Mt. Xingdoushan, Maoba Town, Lichuan City, Hubei Province, 6.VI.1989 (IZCAS); 2♂♂, Chayuan Town, Hefeng District, Hubei Province, 31.V.1989 (IZCAS).

Distribution. China (Fujian, Gansu, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Sichuan, Zhejiang), Korea.

### 21. *Phintella versicolor* (C. L. Koch, 1846)

*Jotus munitus* Bösenberg & Strand, 1906: 334, pl. 14, figs 374, 392 (♂ ♀); Yin & Wang, 1979: 32, figs 13A-E (♂ ♀); Hu, 1984: 370, figs 386.1-6 (♂ ♀).

*Dexippus davidi* Schenkel, 1963: 446, f. 255a-e (♂).

*Phintella versicolor* (C. L. Koch): Prószyński, 1983a: 44, figs 3 (T♂ ♀ from *Chrysilla*); Song, 1987: 288, fig. 245 (♂ ♀); Feng, 1990: 202, figs 177.1-4 (♂ ♀); Chen & Gao, 1990: 191,



figs 243a-b (♂ ♀); Chen & Zhang, 1991: 290, figs 303.1-5 (♂ ♀); Peng *et al.*, 1993: 162, figs 569-576 (♂ ♀); Zhao, 1993: 411, figs 212a-c (♂ ♀); Song, Chen & Zhu, 1997: 1738, figs 50a-c (♀); Song, Zhu & Chen, 1999: 539, figs 308O-P, 309F-G, 328E-F (♂ ♀).

Material examined: 1 ♀, Funong Town, Fangchenggang City, Guangxi Zhuang Autonomous Region, alt. 220m, 19.IV.1998, leg. M. Wu (MHNG); 1 ♀, Longsheng District, Guangxi Zhuang Autonomous Region, 6.III.1998, leg. M. Wu (MHNG); 1 ♂ 1 ♀, Maheba Town, Xianfeng District, Hubei Province (IZCAS); 1 ♀, Jinghong, Yunnan Province, 2.XI.1988 (IZCAS); 4 ♀ ♀, Xinzhuang Town, Xiushan District, Hubei Province, 11.VI.1989 (MHNG).

Distribution. China (Anhui, Guangdong, Guangxi, Hubei, Hunan, Jiangxi, Taiwan, Yunnan, Zhejiang), Hawaii, Japan, Korea, Sumatra.

## 22. *Plexippoides discifer* (Schenkel, 1953)

*Plexippus discifer* Schenkel, 1953b: 88, figs 41 (♂); Yin & Wang, 1979: 38, figs 23A-D (♂ ♀); Yin & Wang, 1981: 271, figs 3A-G (♂, D ♀); Hu, 1984: 384, figs 400.1-5 (♂ ♀).

*Plexippoides discifer* (Schenkel): Prószyński, 1976: 156, fig. 293 (T ♂ into generic nomen nudum); Prószyński, 1984b: 400 (T ♂ from *Plexippus*); Zhu & Shi, 1983: 210, figs 192a-b (♂); Zhang, 1987: 253, figs 225.1-3 (♂); Chen & Gao, 1990: 192, figs 245a-b (♂ ♀); Peng *et al.*, 1993: 173, figs 606-611 (♂ ♀); Zhao, 1993: 417, figs 216a-b (♂); Song, Zhu & Chen, 1999: 540, figs 309P-Q, 310G-H, 328J (♂ ♀).

Material examined: 1 ♂, Qiqi, Yunnan Province, 9.-14.VII.2000 (HNU).

Distribution. China (Beijing, Hebei, Hunan, Shandong, Shanxi, Yunnan, Zhejiang).

## 23. *Plexippus setipes* Karsch, 1879

*Plexippus setipes* Karsch, 1879: 89 (♀); Yin & Wang, 1979: 37, figs 22A-E (♂ ♀); Song, 1980: 202, figs 112a-e (♂ ♀); Wang, 1981: 136, figs 76A-C (♂ ♀); Hu, 1984: 387, figs 403.1-2 (♂ ♀); Guo, 1985: 183, figs 2-106.1-3 (♂ ♀); Zhu & Shi, 1983: 213, figs 195a-c (♀); Song, 1987: 301, figs 257 (♂ ♀); Zhang, 1987: 251, figs 223.1-3 (♀); Feng, 1990: 214, figs 189.1-5 (♂ ♀); Chen & Gao, 1990: 194, figs 248a-c (♂ ♀); Chen & Zhang, 1991: 297, figs 313.1-4 (♂ ♀); Song, Zhu & Li, 1993: 886, figs 63A-D (♂ ♀); Peng *et al.*, 1993: 185, figs 646-652 (♂ ♀); Zhao, 1993: 419, figs 218a-c (♂ ♀); Song, Zhu & Chen, 1999: 541, figs 311I, 312D, 328N (♂ ♀).

*Dexippus berlandi* Schenkel, 1963: 456, figs 259a-e (♀).

Material examined: 1 ♀ (holotype of *Dexippus berlandi* Schenkel, 1963), West Zhejiang, IV.1873 (MNHN); 2 ♂ ♂ 1 ♀, Liuku suburb, Yunnan Province, 25.VI.2000, leg. D Kavanaugh & H. M. Yan (HNU); 2 ♂ ♂ 1 ♀, Liuku along Nujiang, Yunnan Province, 26.VI.2000, leg. D. Kavanaugh, C. Griswold & H. M. Yan (HNU); 1 ♂, Gongshan suburb, Yunnan Province, 26.VI.2000, leg. H. M. Yan (HNU); 1 ♂, Liuku along Yongping, Yunnan Province, 26.VII.2000, leg. D Kavanaugh & H. M. Yan (HNU); 1 ♀, Fulong Town, Fangchenggang City, Guangxi Zhuang Autonomous Region, alt. 200m, 23.IV.1999, leg. G. Q. Zhang (MHNG); 1 ♀, Nanjing, Zhejiang Province, 28.IV.1925, leg. Prof. G. Ping (IZCAS); 1 ♀, Xuanen District, Hubei Province, 24.V.1989 (MHNG); 1 ♂, Yingjiang, Dehong District, Yunnan Province, 10.VII (MHNG); 1 ♂, Mt. Longqi, Jiangle District, Fujian Province, 11.IX.1990, leg. S. Q. Li (IZCAS).

Distribution. China (Anhui, Fujian, Hebei, Gansu, Guangdong, Guangxi, Hubei, Hunan, Jiangsu, Jiangxi, Shanghai, Sichuan, Shaanxi, Shangdong, Shanxi, Yunan, Zhejiang), Japan, Turkmenistan, Vietnam.

## 24. *Pseudeuophrys obsoleta* (Simon, 1868)

*Euophrys bacelari* Schenkel, 1938: 18, figs 7 (♂).

*Euophrys obsoleta* Simon, 1876: 196; Hu & Li, 1987b: 328, figs 48.3-4 (♂).

*Pseudeuophrys obsoleta* (Simon): Zabka, 1997: 78, figs. 272-277 (T ♂ ♀ from *Euophrys*).

No specimens examined.

Distribution. Palearctic Region.

**25. *Pseudicius yunnanensis*** (Schenkel, 1963) comb. nov.

Figs 4-7

*Menemerus? yunnanensis* Schenkel, 1963: 426, fig. 245 (♀); Wesolowska, 1981b: 150, figs 64-67 (♀); Song, Zhu & Chen, 1999: 534, fig. 304D (♀).

Material examined: 1 ♀ (holotype of *Menemerus? yunnanensis*, epigynum missing), Yunnan Province, 1913 (locality given on label: Yunnan-Fou, alt. 1850-2000m) (MNHNP).

Remarks. This species clearly belongs to the genus *Pseudicius* because of the presence of a row of peculiar stridulatory spines on tubercles situated below the eye laterally (arrow in fig. 5) and of corresponding microscopic spines prolaterally on femur I (arrow in fig. 6).

Distribution. China (Yunnan).

**26. *Pseudoheliophanus similis*** Schenkel, 1963

*Pseudoheliophanus similis* Schenkel, 1963: 433 (description of juvenile).

Material examined: 1 ♀ (holotype, immature), collection data missing (according to Schenkel, 1963: "Fluss Barchany im N. von Borobalgassun, Ordos", 12.IX.1884) (MNHNP).

Distribution. China (Inner Mongolia).

**27. *Rhene plana*** (Schenkel, 1936)

*Ballus planus* Schenkel, 1936: 244, fig. 80 (♀).

*Rhene planus* Logunov, 1993: 51, figs 3A-B (T ♀ from *Ballus*); Song, Zhu & Chen, 1999: 558, figs 315A-B (♀).

Material examined. 1 ♀ (paratype of *Ballus planus*), Gansu Province (locality given on label: S. Kansu, K13, Hummen coll.), K13 Hedius Exp. (NMB2161a).

Distribution. China (Gansu).

**28. *Salticus potanini*** Schenkel, 1963

*Salticus potanini* Schenkel, 1963: 410, figs 236a-e (♀); Wesolowska, 1981a: 79, figs 106-107 (♀); Prószyński, 1982: 288, fig. 43 (♀); Tu & Zhu, 1986: 94, figs 34-38 (♂ ♀); Zhang & Zhu, 1987: 33, figs 3A-C (♂ ♀); Zhang, 1987: 254, figs 226.1-4 (♂ ♀); Zhou & Song, 1988: 8, figs 11a-c (♀); Hu & Wu, 1989: 383, figs 300.1-7 (♂ ♀); Chen & Gao, 1990: 197, figs 251a-b (♂ ♀); Peng *et al.*, 1993: 206, figs 727-734 (♂ ♀); Song, Zhu & Chen, 1999: 558, figs 315F-G, I, 329G (♂ ♀).

Material examined: 3 ♂ ♂ 3 ♀ ♀, Qintongxia Forest Farm, Ningxia Hui Autonomous Region, 16.III.1982, leg. L. D. Jia (HNU); 1 ♂ 1 ♀, Yangcheng District, Hebei Province, 12.VII.1980, leg. M. S. Zhu (HNU); 1 ♂, Luguantai, Zhouzhi District, Shaanxi Province, 10.X.1992, leg. X. J. Peng (HNU); 1 ♀, Bohu District, Xinjiang Uygur Autonomous Region, 7.VI.1982, leg. N. L. Zhou (MHNG).

Distribution. China (Hebei, Hubei, Hunan, Jiangsu, Ningxia, Shaanxi, Shanxi, Sichuan, Taiwan, Xinjiang, Zhejiang); Korea, Mongolia.

**29. *Sitticus avocator*** (O. P.-Cambridge, 1885)

*Sitticus paraviduus* Schenkel, 1963: 402, figs 232a-c (♂ ♀); Zhu & Shi, 1983: 215, figs 198a-c (♂).

*Sitticus avocator* (O. P.-Cambridge): Prószyński & Zochowska, 1981: 26, figs 25-26 (T♂ from *Attulus*); Zhou & Song, 1988: 9, figs 12a-f (♂♀); Hu & Wu, 1989: 386, figs 302.6-10 (♂♀); Tang & Song, 1990: 52, figs 4A-C (♀); Song, Zhu & Chen, 1999: 559, figs 315Q-R, 316F-G (♂♀).

Material examined: 1♂ (holotype of *Sitticus paraviduus*), collection data missing (according to Schenkel, 1963: "Grenze Chara su-Cha....., linkes Ufer des Etsingol", 23.-29.VII, 1886) (MNHNP).

Distribution. China (Inner Mongolia, Shanxi, Tibet, Xinjiang), Russia, Central Asia to Japan.

### 30. *Sitticus clavator* Schenkel, 1936

*Sitticus clavator* Schenkel, 1936: 247, fig. 81 (♂); Song, 1987: 303, fig. 259 (♂); Logunov, 1993: 9, figs 7, 24-25 (♂); Song *et al.*, 1996: 108, figs 4A-C (♀); Song, Zhu & Chen, 1999: 559, figs 316H-J, 317A (♂♀).

*Sitticus penicillatus* (Simon): Peng *et al.*, 1993: 218, figs 772-777 (♂♀, misidentified).

Material examined: 1♂1♀, Mt. Huang, Anhui Province, 23.X.1974 (HNU); 2♂♂1♀, Longjing, Jilin Province, 7.-8.VI.1971 (JLU); 1♂, Sanhe District, Jilin Province, V.1971 (JLU); 3♂♂, Yesanpo, Laishui District, Hebei Province, 12.-13.V.2001, leg. X. J. Peng (MHNG).

Distribution. China (Anhui, Gansu, Hebei, Jilin).

### 31. *Sitticus sinensis* Schenkel, 1963

*Sitticus sinensis* Schenkel, 1963: 404, figs 233a-d (♂♀); Yin & Wang, 1979: 39, figs 25A-E (♂♀); Hu, 1984: 391, figs 408.1-3 (♂♀); Zhu & Shi, 1983: 217, figs 200a-i (♂♀); Zhang, 1987: 258, figs 230.1-4 (♂♀); Hu & Wu, 1989: 392, figs 306.1-2 (♀); Chen & Zhang, 1991: 305, figs 323.1-3 (♂♀); Peng *et al.*, 1993: 219, figs 778-786 (♂♀); Zhao, 1993: 426, figs 224a-d (♂♀); Song, Zhu & Chen, 1999: 559, figs 316P, 317D, 329M (♂♀).

Material examined: 1♂3♀♀, Yesanpo Town, Laishui District, Hebei Province, 12.-13.V.2001, leg. X. J. Peng (MHNG); 1♂, Huairou District, Beijing, 1.VI.2001, leg. X. J. Peng (IZCAS); 16♂♂8♀♀, Jilin Province, 1955-1984 (JLU); 7♂♂5♀♀, Beijing City, 6-8.VII.1974 (HNU); 2♂♂, Shijiazhuang, Hebei Province, V.1985 (HNU); 1♀, Manasi District, Xinjiang Uygur Autonomous Region (IZCAS); 2♀♀, Ürümqi, Xinjiang Uygur Autonomous Region, 11.V.1984, leg. W. H. Zhen (MHNG); 1♂1♀, Manasi District, Xinjiang Uygur Autonomous Region, 12.V.1984 (IZCAS); 1♂2♀♀, Bohu District, Xinjiang Uygur Autonomous Region, 15.IV.1981 (IZCAS); 1♂, Luochuan, Shaanxi Province, 10.VI.1981 (IZCAS).

Distribution. China (Beijing, Gansu, Hebei, Hunan, Jilin, Liaoning, Shaanxi, Shandong, Shanxi, Qinghai, Xinjiang).

### 32. *Synagelides cavaleriei* (Schenkel, 1963)

*Tagoria cavaleriei* Schenkel, 1963: 394, figs 227a-l (♂♀).

*Synagelides cavaleriei* (Schenkel): Bohdanowicz & Heciak, 1980: 248, figs 1-9 (♂♀); Song, 1987: 306, figs 262 (♂♀); Bohdanowicz, 1987: 66, figs 1-4 (♂♀); Hu & Li, 1987b: 334, figs 49.3-4 (♀); Song, Zhu & Chen, 1999: 560, figs 318L-M, 319D-E (♂♀).

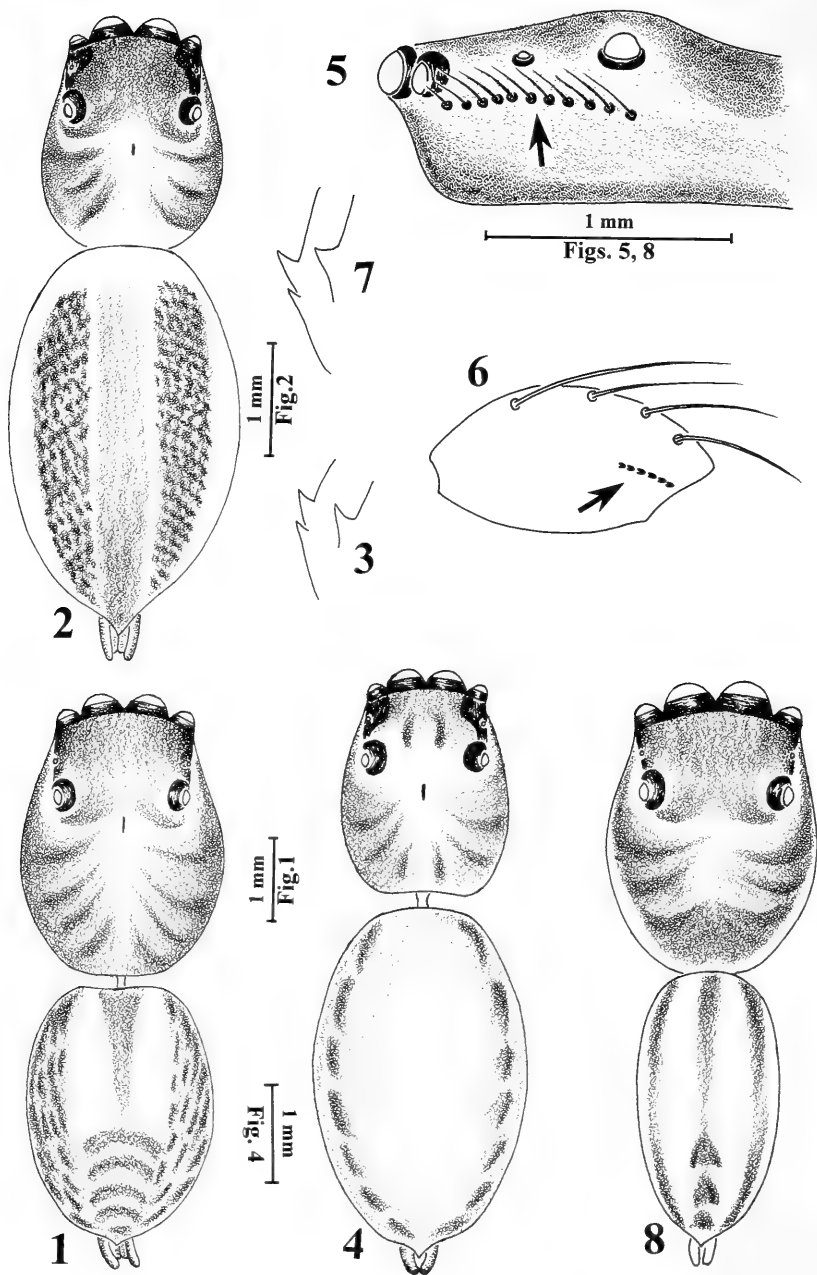
Material examined: 1♂1♀ (syntypes of *Tagoria cavaleriei*), today's name of locality not known (locality given on label: Anschunfou) (MNHNP); 3♂♂, Mt. Qijiemeishan, Xuanen District, Hubei Province, 25.V.1989, leg. S. Q. Li (IZCAS).

Distribution. China (Guizhou, Hubei, Tibet).

### 33. *Talavera trivittata* (Schenkel, 1963)

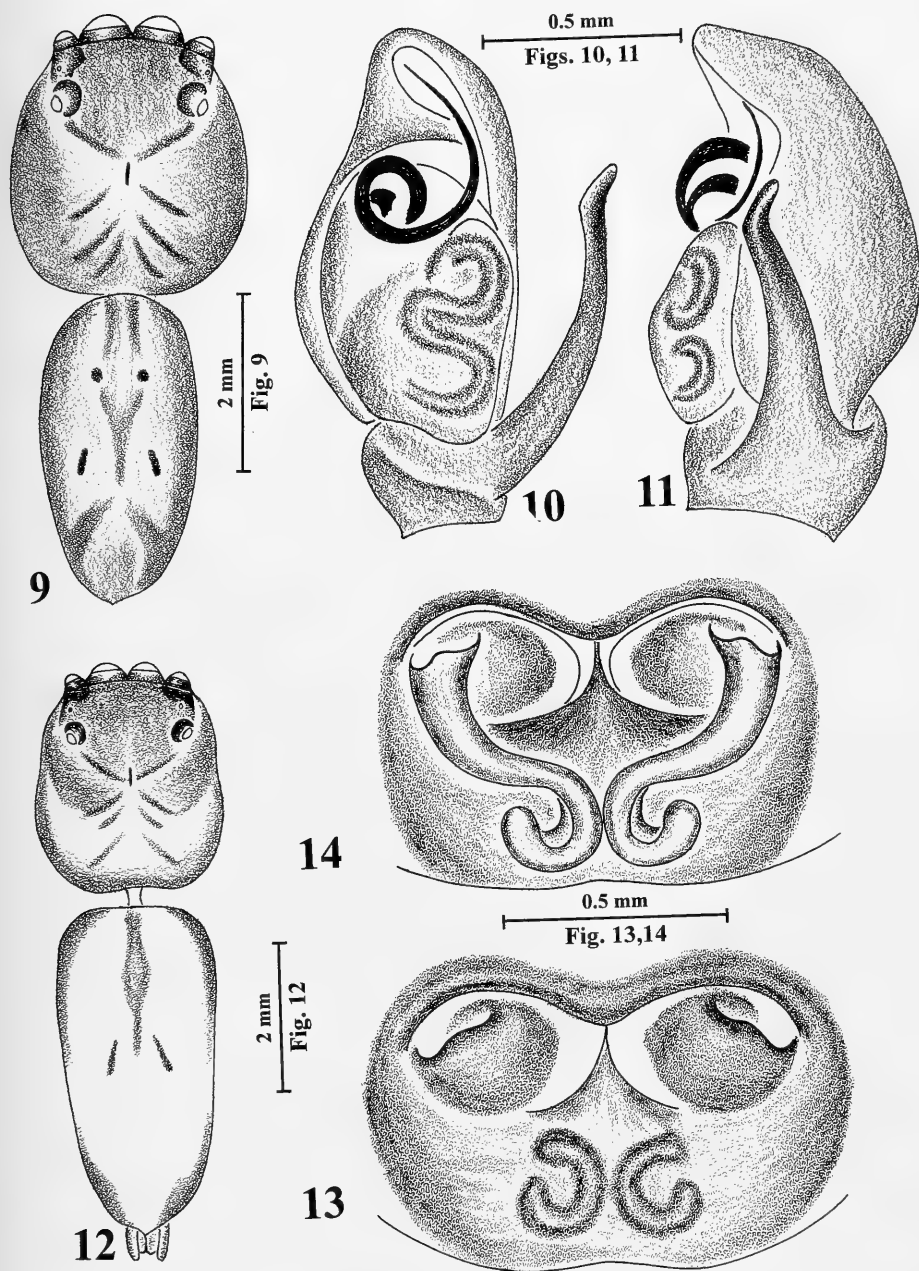
Fig. 8

*Euophrys trivittata* Schenkel, 1963: 401, figs 231a-b (♀); Wesolowska, 1981b: 130, figs 8-9 (♀); Hu, 1984: 359, figs 374.1-2 (♀); Paik, 1986: 20, figs 1-10 (♂♀); Hu & Wu, 1989: 363, figs 285.3-4 (♀).



FIGS 1-8

1. Body of *Asianellus potanini* (Schenkel, 1963), male. 2-3. *Heliophanus potanini* (Schenkel, 1963): 2 body of female; 3 cheliceral teeth. 4-7. *Pseudicius yunnanensis* (Schenkel, 1963) comb. nov.: 4 body of female; 5 carapace, lateral view; 6 femur I, prolateral view; 7 cheliceral teeth. 8. Body of *Talavera trivittata* (Schenkel, 1963), male.



FIGS 9-14

9-11. *Thiania cavaleriei* Schenkel, 1963: 9 body of male; 10 left palpal organ, ventral view; 11 left palpal organ, retrolateral view. 12-14. *Thiania luteobrachialis* Schenkel, 1963: 12 body of female; 13 epigynum; 14 vulva.

*Talavera trivittata* (Schenkel): Logunov, 1992: 78 (T♂ ♀ from *Euophrys*); Song, Zhu & Chen, 1999: 561, fig. 321F (♀).

Material examined: 1 ♀ (holotype of *Euophrys trivittata*), collection data missing (according to Schenkel, 1963: "Kloster Schine, Sume, Ordos", 9.IX.1884) (MNHNP).

Distribution. China (Inner Mongolia), Korea, Japan.

### 34. *Tasa davidi* (Schenkel, 1963)

*Thianella davidi* Schenkel, 1963: 412, figs 237a-e (♂).

*Tasa davidi* (Schenkel): Wesolowska, 1981b: 157, figs 88-92 (♂); Peng *et al.*, 1993: 230, figs 819-823 (♂); Song, Zhu & Chen, 1999: 561, figs 319L-M, 330B (♂); Peng, Gong & Kim, 2000: 13, figs 15-18 (♀).

Material examined: 3♂♂, Daoxian District, Hunan Province, 24.IV.1988, leg. L. S. Gong (MHNG); 1♂3♀♀, Ganxia Town, Daoxian District, Hunan Province, 3.VII.1987, leg. L. S. Gong (HNU); 3♀♀, Bajia Town, Daoxian District, Hunan Province, 31.IX.1987, leg. L. S. Gong (HNU); 1♀, Shuangqiao Town, Daoxian District, Hunan Province, 10.VIII.1987, leg. L. S. Gong (HNU); 1♂, Ningxiang District, Changsha City, VIII.1986, leg. X. Q. Xiao (HNU); 1♀, Mt. Lushan, Jiangxi Province, VI.1987, leg. L. P. Xie (HNU); 3♂♂, Daoxian District, Hunan Province, 24. IX.1988, leg. L.S. Gong (HNU).

Distribution. China (Hunan, Jiangxi, Shaanxi).

### 35. *Thiania cavaleriei* Schenkel, 1963

Figs 9-11

*Thiania cavaleriei* Schenkel, 1963: 406, figs 234a-g (♂); Prószyński, 1976: 150, fig. 94 (♂); Prószyński, 1984a: 147 (♂); Song, Zhu & Chen, 1999: 562, figs 320L-M (♂).

Material examined: 1♂ (holotype of *Thiania cavaleriei*), today's name of locality not known (locality given on label: Anschunfu) (MNHNP).

Distribution. China (Gansu).

### 36. *Thiania luteobrachialis* Schenkel, 1963

Figs 12-14

*Thiania luteobrachialis* Schenkel, 1963: 408, fig. 235 (♀).

Material examined: 1♀ (holotype of *Thiania luteobrachialis*), today's name of locality not known (locality given on label: "Lo Thoei-Tong") (MNHNP).

Distribution. China.

### 37. *Thyene imperialis* (Rossi, 1846)

*Thyene imperialis* (Rossi): Peckham & Peckham, 1901: 307, pl. 25, fig. 4; Wesolowska, 1981a: 75, figs 94-101 (♂ ♀); Prószyński, 1987: 109-110 (♂); Peng *et al.*, 1993: 242, figs 862-868 (♂ ♀); Xie & Peng, 1995: 107, figs 5A-F (♂ ♀).

*Thyene sinensis* Schenkel, 1963: 441, figs 253a-f (♀).

Material examined: 2♂♂, Chongan District, Fujian Province, VII.1986 (HNU); 1♂, Wuning District, Guangxi Zhuang Autonomous Region, VIII.1981 (HNU); 1♂, Tianlin District, Guangxi Zhuang Autonomous Region, IX.1981 (HNU); 2♂♂, Jianfeng, Ledong District, Hainan Province, XII.1989 (MHNG).

Distribution. China (Fujian, Guangdong, Guangxi, Hainan, Hubei), Old World.

## RESULTS AND DISCUSSION

Dr E. Schenkel described 41 new salticids species from China between 1936 and 1963. 13 of them remain in the original combination: i.e. *Bianor hotingchiehi* Schenkel, 1963; *Hasarina contortospinosa* Schenkel, 1963; *Heliophanus potanini* Schenkel, 1963; *Menemerus legendrei* Schenkel, 1963; *Menemerus wuchangensis*

Schenkel, 1963; *Pellenes denisi* Schenkel, 1963; *Pellenes gobiensis* Schenkel, 1936; *Pseudoheliophanus similis* Schenkel, 1963; *Salticus potanini* Schenkel, 1963; *Sitticus clavator* Schenkel, 1936; *Sitticus sinensis* Schenkel, 1963; *Thiania cavaleriei* Schenkel, 1963; *Thiania luteobrachialis* Schenkel, 1963.

9 species were earlier transferred to other genera; one is transferred in this paper:

1. *Ballus planus* Schenkel, 1936 = *Rhene plana* (Schenkel, 1936)
2. *Davidia magnidens* Schenkel, 1963 = *Davidina magnidens* (Schenkel, 1963)
3. *Dexippus cavaleriei* Schenkel, 1963 = *Phintella cavaleriei* (Schenkel, 1963)
4. *Euophrys trivittata* Schenkel, 1963 = *Talavera trivittata* (Schenkel, 1963)
5. *Menemerus fagei* Schenkel, 1963 = *Heliophanus potanini* Schenkel, 1963
6. *Menemerus yunnanensis* Schenkel, 1963 = *Pseudicius yunnanensis* (Schenkel, 1963) comb. nov.
7. *Phlegra potanini* Schenkel, 1963 = *Asianellus potanini* (Schenkel, 1963)
8. *Plexippus discifer* Schenkel, 1953 = *Plexippoides discifer* (Schenkel, 1953)
9. *Tagoria cavaleriei* Schenkel, 1963 = *Synagelides cavaleriei* (Schenkel, 1963)
10. *Thianella davidi* Schenkel, 1963 = *Tasa davidi* (Schenkel, 1963)

17 species were placed in synonymy:

1. *Carrhotus pichoni* Schenkel, 1963 = *Carrhotus xanthogramma* (Latreille, 1819)
2. *Dexippus berlandi* Schenkel, 1963 = *Plexippus setipes* Karsch, 1879
3. *Dexippus davidi* Schenkel, 1963 = *Phintella versicolor* (C. L. Koch, 1846)
4. *Dexippus lesserti* Schenkel, 1963 = *Phintella arenicolor* (Grube, 1861)
5. *Dexippus tschekiangensis* Schenkel, 1963 = *Phintella versicolor* (C. L. Koch, 1846)
6. *Euophrys bacelari* Schenkel, 1938 = *Pseudeuophrys obsoleta* (Simon, 1868)
7. *Evarcha pichoni* Schenkel, 1963 = *Evarcha albaria* (L. Koch, 1878)
8. *Heliophanus berlandi* Schenkel, 1963 = *Heliophanus curvidens* (O. P.-Cambridge, 1872)
9. *Menemerus bonneti* Schenkel, 1963 = *Menemerus bivittatus* (Dufour, 1831)
10. *Menemerus sinensis* Schenkel, 1963 = *Menemerus fulvus* (L. Koch, 1878)
11. *Menemerus schensiensis* Schenkel, 1963 = *Menemerus fulvus* (L. Koch, 1878)
12. *Mithion hotingchiehi* Schenkel, 1963 = *Mendoza elongata* (Karsch, 1879)
13. *Mithion pichoni* Schenkel, 1963 = *Mendoza canestrinii* (Ninni, 1868)
14. *Mithion tschekiangensis* Schenkel, 1963 = *Mendoza canestrinii* (Ninni, 1868)
15. *Phlegra pichoni* Schenkel, 1963 = *Asianellus festivus* (C. L. Koch, 1834)
16. *Sitticus paraviduus* Schenkel, 1963 = *Sitticus avocator* (O. P.-Cambridge, 1885)
17. *Thyene sinensis* Schenkel, 1963 = *Thyene imperialis* (Rossi, 1846)

*Myrmarachne lesserti* Schenkel, 1963 is preoccupied by *M. lesserti* Lawrence, 1938, and was renamed as *Myrmarachne schenkeli* Peng & Li, 2002.

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## New *Sphaerochthonius* species from the Neotropical region (Acari: Oribatida)

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**New *Sphaerochthonius* species from the Neotropical region (Acari: Oribatida).** - Two new species of the family Sphaerochthoniidae (Acari: Oribatida) are described and illustrated. *Sphaerochthonius litoralis* sp. n. occurs in the littoral zone of several islands of the Galápagos archipelago (Ecuador), *S. windsori* sp. n. was collected in dry deciduous forests in Panamá. Adult and juvenile instars of both species are described. A key of *Sphaerochthonius* species known from the Neotropical region is added.

**Key-words:** *Sphaerochthonius* - Acari - Oribatida - taxonomy - new species - Galapagos Islands - Panama - Neotropical Region.

## INTRODUCTION

Members of the oribatid mite genus *Sphaerochthonius* are inhabitants of organic litter. They are known from all zoogeographic regions, but occur mainly in the tropics and subtropics. Up to now, four *Sphaerochthonius* species have been described and recorded from the Neotropical region, most of them from one site and single specimen: *Sphaerochthonius fungifer* Mahunka, 1983 (Guatemala, Tikal), *S. phyllophorus* Balogh & Mahunka, 1969 (Brazil, Rio de Janeiro; see also Balogh *et al.*, 1969), *S. uruguayensis* Pérez-Iñigo & Sarasola, 1998 (Uruguay, San Miguel mountain forest) and *S. splendidus* (Berlese, 1904) (Galápagos Islands, see Schatz, 1998, 1999). An additional undescribed species was reported from the Galápagos Islands in the Eastern Pacific Ocean (Schatz, 1998, 1999). The latter species is described in this paper, along with another new *Sphaerochthonius* species from Panamá.

The notogastral setal nomenclature follows that of Grandjean (1934) as summarized by Hunt *et al.* (1998). All measurements are given in micrometers (µm).

## DESCRIPTIONS AND REMARKS

***Sphaerochthonius litoralis* sp. n.**

Figs 1-14

*Sphaerochthonius* sp. Schatz, 1998: 379; Schatz, 1999: 504

**Type material:** The adult holotype (type locality: Ecuador, Galápagos Islands, Isla Sombbrero Chino southeast off Isla Santiago, near Cape Trenton, 0° 22' S, 90° 35' W) and 2 adult paratypes from the same locality are preserved in alcohol and will be deposited in: Muséum d'histoire naturelle, Genève, Switzerland, other specimens in the author's collection in Innsbruck, Austria.

*Other material examined:* *Sphaerochthonius litoralis* sp. n. is known from 56 specimens (54 adults, 2 tritonymphs) collected on eight islands of the Galápagos Archipelago. No morphological differences between the populations on the different islands were observed. All records are from the eastern and central islands of the Galápagos.

*Specific collection data* (all collections by the author): Isla Bartolomé, near Pinnacle Rock, littoral zone: sea level, in dry to moist leaf litter under *Maytenus octogona* (11.ii.1985: 1 adult, 26.xii.1986: 6 adults), in moist mangrove leaf litter under *Laguncularia racemosa* (26.xii.1986: 1 adult). Isla Floreana (Santa Maria), at flamingo lagoon in Punta Cormorán, littoral zone: at sea level, in moist, decayed mangrove leaf litter under *Laguncularia racemosa* (6.iv.1985: 6 adults). Isla Santa Fé, northeastern part, littoral to arid zone: above beach, 5 m a.s.l., in dry to moist leaf litter under *Cordia lutea* (14.iii.1983: 1 adult). Isla Genovesa, Darwin Bay, littoral zone: at sea level, lava crevice, in dry to moist decayed leaf litter under *Rhizophora mangle* (17.ii.1985: 3 adults); around Lake Arcturus, littoral zone: 20 m a.s.l., in moist, decayed leaf litter and black humus under *Rhizophora mangle* (16.ii.1985: 3 adults). Isla Rábida, littoral zone: at flamingo lagoon, 5 m a.s.l., in moist, decayed mangrove leaf litter under *Rhizophora mangle* (14.iii.1988: 3 adults). Isla San Cristobal, littoral zone: south of Wreck Bay, behind rocky coast, at sea level, in moist leaf litter under *Conocarpus erecta* and *Laguncularia racemosa* (4.i.1987: 1 adult); in moist and salty, well-decayed leaf litter, humus and rotten wood under *Avicennia germinans* (4.i.1987: 5 adults, 1 tritonymph). Isla Santa Cruz, near Charles Darwin Research Station, littoral zone: 5 m a.s.l., in moist leaf litter and humus under *Sesuvium portulacastrum* (3.iii.1985: 1 adult); *ibid.*, behind coast, 5 m a.s.l., in dry to moist, well-decayed leaf litter and pieces of wood under *Hippomane manzinella* (22.i.1987: 1 adult). Puerto Ayora, near Hotel "Fragata", littoral zone: at sea level, in moist, decayed mangrove leaf litter under *Avicennia germinans* (30.xii.1986: 3 adults); *ibid.*, in moist, decayed leaf litter under *Sesuvium portulacastrum* (30.xii.1986: 4 adults). South of Puerto Ayora, "Divine's Bay", littoral zone: at sea level, in moist, partially decayed mangrove leaf litter under *Rhizophora mangle* (29.xii.1986: 8 adults). West of Canal de Itabaca, littoral zone: 5 m a.s.l., in moist, partially decayed mangrove leaf litter and sand under *Avicennia germinans* (13.i.1987: 1 adult). Transition zone near "Caseta": 180 m a.s.l., in dry old dropping of giant tortoise, containing digested grass (26.ii.1985: 1 adult). Moist zone: *Scalesia* forest near Cerro Crocker, 700 m a.s.l., in dry to moist bark, lichens and moss on a *Scalesia pedunculata* trunk, arboricolous (6.iii.1987: 1 adult). Isla Sombrero Chino, northern part, near lava flow, littoral zone, 5 m a.s.l., in moist, decayed leaf litter and red soil under *Sesuvium edmonstonei* (21.ii.1987: 3 adults, 1 tritonymph); *ibid.*, in dry to moist, decayed leaf litter and humus under *Heliotropium angiospermum* (21.ii.1987: 1 adult).

*Diagnosis:* Adults of the new species differs from its congeners by the following combination of character states: surface structure on prodorsum and on major part of notogaster consisting of a polygonal network with triangular thickenings in its angles; nose-shaped protuberance on prodorsum present; except setae *exa*, *exp*, *d*, all prodorsal and notogastral setae biramous, papillate; adoral, subcapitular, epimeral, genital and anal setae distally almost flagelliform; 8 pairs of genital, 9-11 pairs of anal and 5 pairs of adanal setae present, the latter uniramous with branching papillae, setae (*ul*) on palptarsus fused, bifid. Tritonymph with biramous and ciliate setae *d* and asymmetric biramous setae *e*.

*Adult* (Figs 1-12): Total body size (n=38): 321 (range: 280-350) x 192 (170-215), length of notogaster 217 (195-225, 66-70% of total body length). Color yellow to light brown. Prodorsal and major part of notogastral surface (plates *Na*, *Py* and *Is*) covered with polygonal network, margins and especially angles of areolae irregularly thickened, surface granulate (Fig. 6). Reticulation of cuticle accentuated by cerotegument. Lateral plates of notogaster, mentum, epimeral, genital and ano-adanal plates with granulate surface.

Prodorsum (Fig. 1): Shape elongate, lateral edges slightly converging anteriorly. Rostrum medially with a thickened, nose-shaped protuberance, slightly protruding anteriorly beyond anterior margin of prodorsal shield. Surface structure polygonal to hexagonal as on notogaster, area between interlamellar setae with larger polygons. Rostral, lamellar and interlamellar setae biramous, papillate ("T-shaped" in the sense of Wallwork, 1960), both rami of *ro*, *le* almost equal in length, *il* with longer anterior rami, extension of both rami *ro* 40-50, *le* 50-55, *il* 30-35 long. Anterior (*exa*) and posterior (*exp*) exobothridial setae inserted close to each other anterolateral to bothridia; both uniramous, papillate, *exa* ~12, *exp* 25 long. Bothridia directed laterad, head of sensilli ramose with branching papillae, rami directed dorsad (hence sensilli appearing narrow in dorsal view, see Fig. 1, broader in lateral view, see Fig. 2), total length of sensilli 50, head 40. Between bothridia a small elevated ridge present on prodorsum.

Notogaster (Figs 1-3): Shape almost round. Small angle on each side of notogaster on broadest part, formed by lateral angle of triangular lateral plates *L*. Broad transverse scissure (of type "L" in the sense of Grandjean, 1947; see Norton, 2001) present between plates *Na* and *Py*, originating from lateral angles of plates *L*, curved anteriorly, covered by hypertrophied posterior part of plate *Na*, hiding insertions of setal row *d* on scissure. Indistinct thickened suture present on plate *Py*, also originating from lateral angles of plates *L*, almost transverse, passing near insertions of setal row *e*. On ventral side single transverse scissure anterior to plate *Py* and straight longitudinal scissure present on each side between plates *Is* and *L*.

Sixteen pairs of notogastral setae present. Setae *d* short, setiform, smooth, *d*<sub>1</sub> 4-5, *d*<sub>2</sub> 7 long. Other notogastral setae biramous, papillate. Rami of setal row *c* aligned in almost longitudinal direction, slightly asymmetric with shorter anterior rami, extension of both rami: *c*<sub>1</sub> 75, *c*<sub>2</sub> 65-70, *c*<sub>3</sub> 65-70, *c*<sub>p</sub> 60-70, rami of setae *e* aligned transversely, extension *e*<sub>1</sub> 70-75, *e*<sub>2</sub> 60, rami of *f*<sub>1</sub> aligned longitudinally, extension 70, rami of *f*<sub>2</sub> aligned transversely, extension 60, setae *h*<sub>1</sub>-*h*<sub>3</sub> on edge of notogaster, extension of both rami 60, setae *ps*<sub>1</sub>-*ps*<sub>3</sub> visible in lateral and ventral view, extension of both rami: *ps*<sub>1</sub> 50-60, *ps*<sub>2</sub>, *ps*<sub>3</sub> 40-50, setae *ps*<sub>2</sub> and *ps*<sub>3</sub> inserting on plates *Is* lateral to ano-adanal plates.

Gnathosoma (Figs 3-5): Mentum small (35 x 30), subcapitular setae setiform, basally slightly thickened, distally very thin, almost flagelliform, *h*, *m*<sub>1</sub>, *m*<sub>2</sub> 10-12, *a* 16-20 long. Three pairs of adoral setae present, same shape as subcapitular setae, ~12 long. Chelicerae (Fig. 4) of chelate-dentate type, narrow, size (n=6): 45-60 x 20-25, movable digit 20-25 long, both setae inserted near dorsal margin, directed anteriorly, *cha* setiform, ciliate, 20-22 long, *chb* strongly thickened, palmate, 10-12 long. Palps (Fig. 5) with 5 short articles, attenuating from trochanter to tibia, tarsus distally prolonged. Setal formula (trochanter to tarsus, solenidion in parentheses) 0 - 2 - 1 - 3 - 11(1), setae *cm* 40 long, *acm* flagelliform, 35 long, with a distal loop, other tarsal setae relatively long (12-15). Setae (*ul*) and *sul* eupathids, (*ul*) fused, bifid with long curved seta and short spine.

Epimeral region (Fig. 3): Epimeral plates I and II separate, plates III and IV almost completely fused on each side. Epimeral setal formula 3-2-3-4, setae *3c* inserting on anteriorly directed apophyses, setae *4b*, *4c*, *4d* in one row on posterior part of plate. Setae relatively long, setiform, basally slightly thickened, distally very thin,

almost flagelliform, *1a*, *1c*, *2a*, *2b* ciliate, others smooth, *1c*, *2a*, *2b* 25-30, others 15-20 long.

Genito-anal region (Figs 3, 7): Genital plates small, elongate (70-75 x 20), shape oval, surface granulate. Eight pairs of genital setae present, shape as epimeral setae, 20-27 long. Anal and adanal plates fused. Ten pairs of anal setae present (some specimens with 9 or 11 pairs), basally thickened, distally very thin, almost flagelliform, curved mediad and posteriad, 12-15 long. Five pairs of adanal setae present (Fig. 7), uniramous with branching papillae, 20-30 long, bases connected by a sclerotized ridge.

Legs (Figs 8-12): Legs of moderate length (without claws 30-37% of body length). Setal formulas of legs (trochanter to tarsus, solenidia in parentheses): leg I 0 - 4 - 4 - 6(1) - 19(3), leg II 1 - 5 - 4 - 6(1) - 17(2), leg III 2 - 3 - 3 - 4(1) - 12, leg IV 2 - 3 - 3 - 4(1) - 11. All legs heterotridactylous, with a small, but strong median claw and two almost setiform lateral claws. Setae *d* and *l''* on femur I and setae *d* on femora II - IV thickened and densely ciliate. Solenidia  $\omega_1$  on tarsus I curved anteriad, covered with cerotegument granulae, 25 long, solenidia  $\varphi_1$  on tibia I very long (85-90), inserted on large distal projection.

*Immatures* (Figs 13,14): Tritonymph: Color pale. Size (n=2) 275-295 x 180, notogaster 200-210 long.

Prodorsum (Fig. 13): Nose-shaped structure as in adult. Prodorsal setae as in adult, extension of both rami: *ro* 40, *le* 50, *il* 35, anterior ramus of *il* almost twice as long as posterior one, *exa* 10, *exp* 18-20. Total length of sensilli 50  $\mu$ m, head 30.

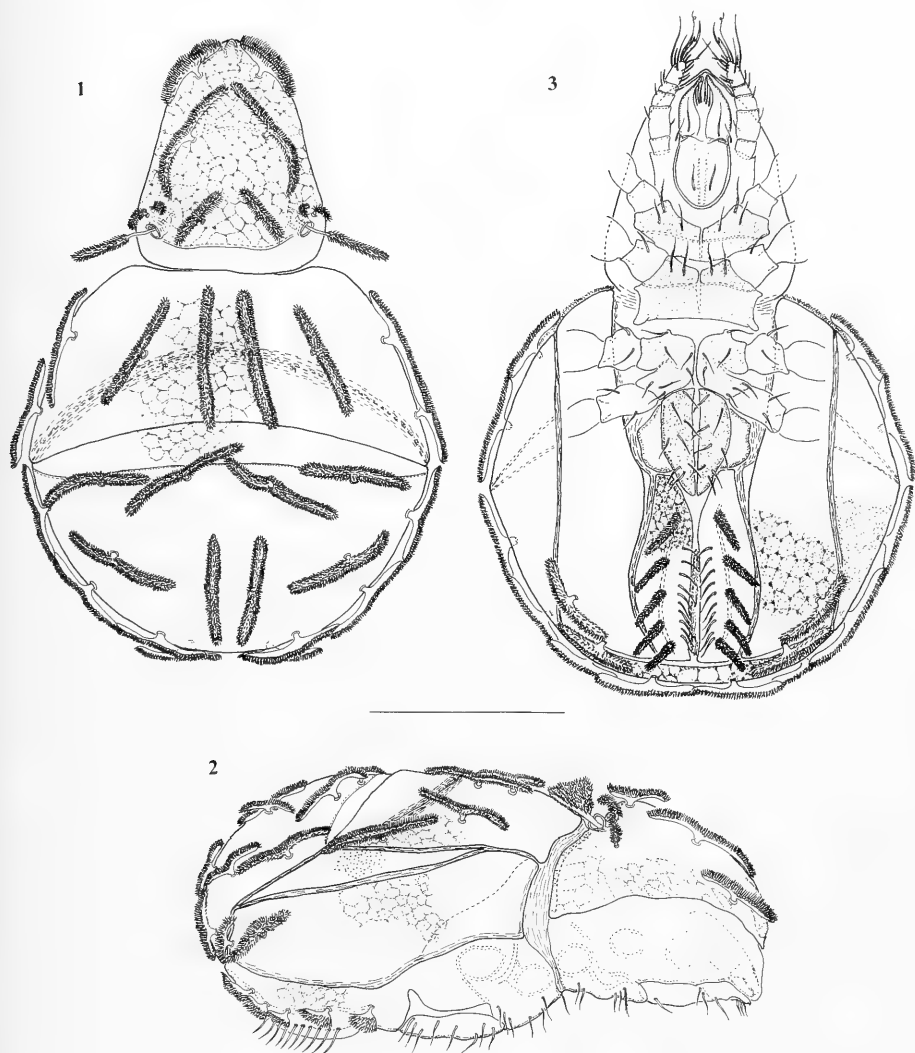
Gastronotic region (Figs 13,14): Broad dorsal scissure between plates *Na* and *Py* well-developed and deep, additional posterior scissure present along insertions of setal row *e*. Surface structure of plates *Na*, *Py*, *Is* with polygonal structure as in adults, lateral plates *L* triangular, surface granulate with radial striae, inner margin with a series of folds. Sixteen pairs of notogastral setae present, setae  $c_1$ - $c_p$  biramous, papillate, extension of both rami 55-60. Setae *d* on anterior slope of cavity, biramous, ciliate, small, rami directed transversely, extension of both rami:  $d_1$  17,  $d_2$  8-10. Setae *e* biramous, papillate, asymmetric, with long rami directed posteriad,  $e_1$  70-80,  $e_2$  40-50 long, and short second rami originating on base, directed mediad, 15-20 long, setae *f*, *h*, *ps* biramous, papillate, extension of both rami: *f*, *h*,  $ps_1$  45-55,  $ps_2$ ,  $ps_3$  35, latter inserting on plate *Is*, rami aligned almost transversely, rami of setal row *f* aligned longitudinally, others parallel to body edge.

Gnathosoma (Fig. 14): Size of mentum 30x20, subcapitular setae 12-14 long. Palps: setal formula as in adult, setae *acm* 25-30 long, setae (*v*) short, thick, spiniform, (*ul*) fused, bifid.

Ventral region (Fig. 14): Shape of epimeral plates and shape, position and number of epimeral setae as in adult, setae of rows 1 and 2 12-15 long, others 6-9. Genital plates with 3 pairs of genital papillae, 7 pairs of genital setae, 10-12 long. Anal and adanal plates fused, 9 pairs of anal setae, 9-10 long, and 5 pairs of adanal setae present, the latter uniramous, papillate, 20 long. Shape of genital and anal setae as in adults.

Legs: All legs monodactylous, setal formula as in adults, setae *d* and *l''* on femur I and setae *d* on femora II - IV thickened with short ciliae. Solenidion  $\varphi_1$  on tibia I 70-75 long.



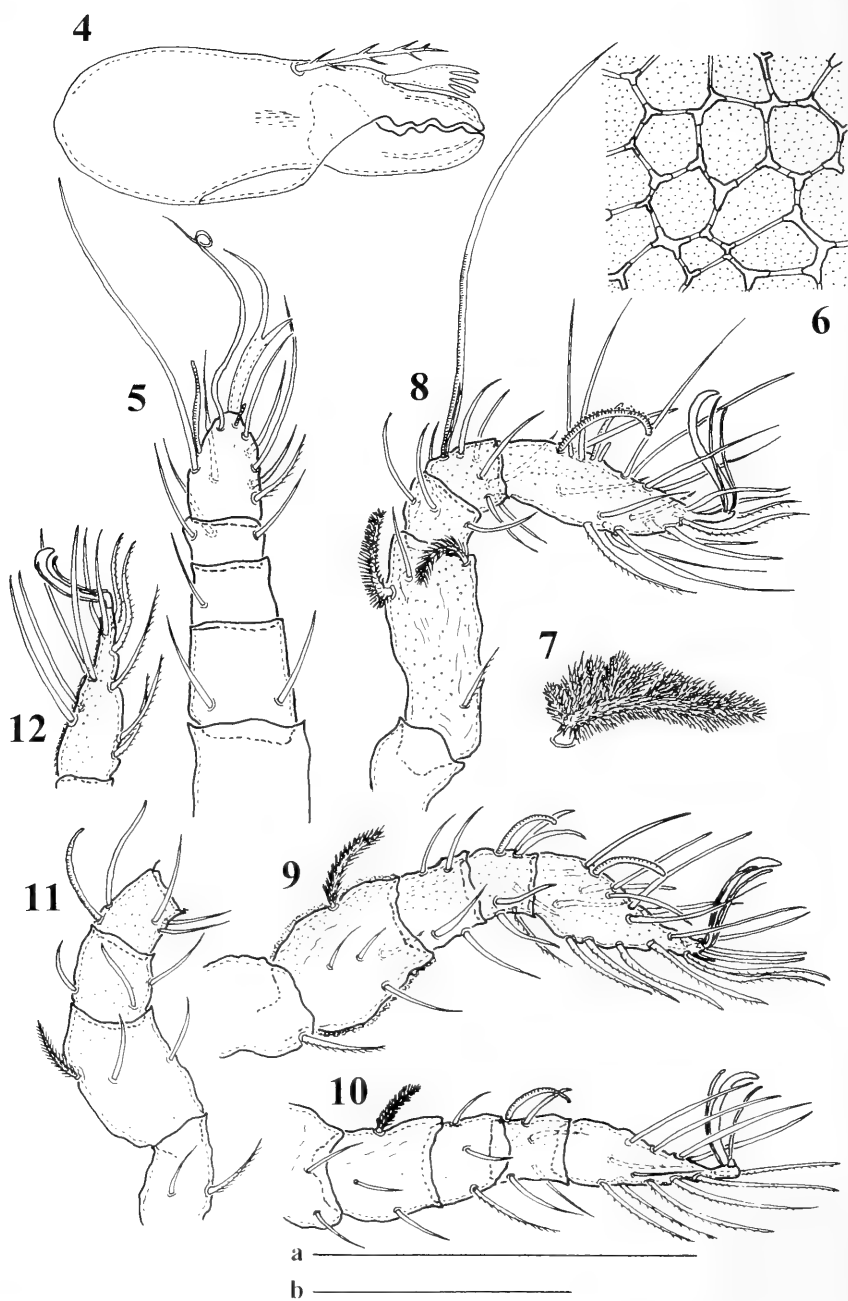


FIGS 1-3

*Sphaerochthonius litoralis* sp. n., adult - 1. Dorsal view; 2. Lateral view; 3. Ventral view (Scale: 100  $\mu$ m).

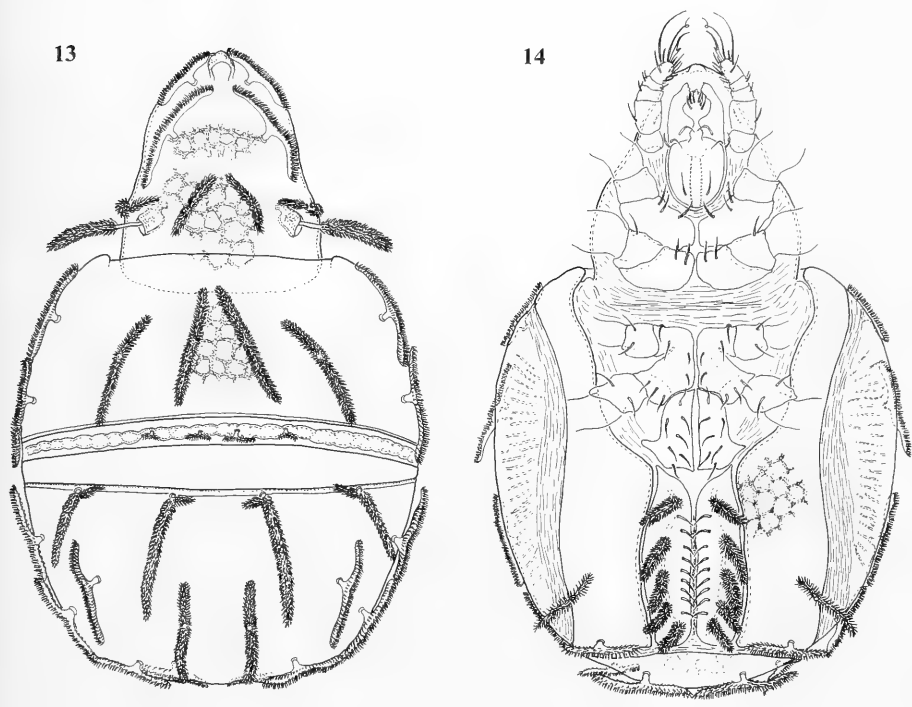
**Etymology:** The name is derived from the Latin word “litoralis” = “belonging to the littoral” and refers to the known preferred habitat of the species.

**Remarks:** In many aspects the new species morphologically corresponds with the original description of *S. transversus* Wallwork, 1960. Both species have a reticulate surface structure, biramous notogastral setae with rami of almost equal length, especially in row *e* and *f*, and 5 pairs of adanal setae. Differences between the two species are found in: the presence of a nose-shaped structure on prodorsum in



FIGS 4-12

*Sphaerochthonius litoralis* sp. n., adult - 4. Chelicera; 5. Palp; 6. Surface structure on notogaster; 7. Adanal setae  $ad_1$ ; 8. Leg I; 9. Leg II; 10. Leg III; 11. Leg IV, trochanter - tibia; 12. Leg IV, tarsus. All appendages in abaxial aspect (Scale a - Figs 4-7, Scale b - Figs 8-12: 50  $\mu$ m).



FIGS 13-14

*Sphaerochthonius litoralis* sp. n., tritonymph - 13. Dorsal view; 14. Ventral view (Scale: 100  $\mu$ m).

*S. litoralis*, the shape of interlamellar setae *il* (*litoralis*: biramous, *transversus*: uniramous), details in surface structure (*litoralis*: triangles in angles of polygons, *transversus*: dense granulate secretion along edges of polygons), shape of adanal setae (*litoralis*: widely branching, *transversus*: biramous with very short inner rami), in setation of palptarsi (*litoralis*: setae (*ul*) fused, bifid with 1 long and 1 short seta, *transversus*: setae (*ul*) fused, bifid with 2 long setae), and in shape of setae *d*, *e* in tritonymphs (*litoralis*: *d*<sub>1</sub>, *d*<sub>2</sub> biramous, *e*<sub>1</sub>, *e*<sub>2</sub> biramous, anterior ramus short, *transversus*: setae *d* not mentioned, probably very short, setae *e* uniramous).

The number of anal setae varies in *S. litoralis*: 75% of the adult population on the Galápagos Islands bear 10 pairs, 7.5% 9 pairs, and 17.5% 11 pairs. No correlation between the anal setation and occurrence on different islands or sites could be found. This character is variable within several species of the family; different numbers of anal setae are known from *Similochthonius australis* (Mahunka, 1985): 5-7, *S. decoratus* Mahunka, 1985: 4-5, *Sphaerochthonius strinatii* Mahunka, 1982: 9-10, *S. suzukii* Aoki, 1977: 7-8, *S. transversus* Wallwork, 1960: 10 and more, *S. variesetosus* Mahunka, 1997: 10-13 pairs of anal setae.

The tritonymph of *Sphaerochthonius litoralis* sp. n. differs from the adult instar by the smaller posterior edge of plate *Na*, leaving the scissure and setae *d* uncovered;

by the presence of an additional transverse scissure along setal row *e*, which is reduced to an indistinct suture in adults; by the shape of setae *d* and *e*; by the number of genital and anal setae; and by the number of claws. The monodactyly and the number of dorsal scissures ("coupures") in juvenile instars of *Sphaerochthoniidae* are discussed in van der Hammen (1959).

*Ecology*: The vast majority of specimens of *Sphaerochthonius litoralis* sp. n. was collected in the littoral zone. This species occurs mainly in moist, partially decayed to strongly decayed leaf litter under mangroves and other deciduous trees, as well as under *Sesuvium* and *Heliotropium*, also in deeper humus layers. Remarkable records are from the shore of Lake Arcturus, a remote saltwater crater lake in the interior of Isla Genovesa (3 specimens); in an old giant tortoise dropping at the transition zone of Isla Santa Cruz (1 specimen); and in epiphytic lichens and moss in a highland cloud forest of the same island (1 specimen).

### *Sphaerochthonius windsori* sp. n.

Figs 15-26

*Material examined*: Rep. Panamá: Madden Dam (type locality: 9°12,5' N, 79°37,2' W, 45 m a.s.l.), dry deciduous forest, in decayed leaf litter and humus under *Bursera simaruba* (8.ii.1996: 7 adults, 1 trito-, 1 protonymph, H. Schatz coll.). Isla Taboga, along Sendero Las Tres Cruces (9°33,5' N, 8°37,1' W, 100 m a.s.l.), dry deciduous forest, in decayed litter with pieces of wood (24.i.1996: 2 adults, H. Schatz coll.). The adult holotype and 2 adult paratypes from the same locality are preserved in alcohol and will be deposited in: Muséum d'histoire naturelle, Genève, Switzerland, other specimens in the author's collection in Innsbruck, Austria.

*Diagnosis*: Adults of the new species differs from its congeners by the following combination of character states: surface structure on prodorsum and on major part of notogaster consisting of polygonal network surrounded by relatively large round and elevated areolae; nose-shaped protuberance present on prodorsum; except setae *exp*, *d*, all prodorsal and notogastral setae biramous, both rami almost equal in length or slightly asymmetric, ciliate to papillate; rami of notogastral setae *e*, *f* aligned in transverse direction; 8 pairs of genital, 4 pairs of anal and 4 pairs of biramous adanal setae present; seta *l'* on palptarsus with ciliae at right angle, setae (*ul*) fused, bifid. Juvenile instars: setae *d* very short, setiform, setae *e* and *f* biramous, rami aligned in transverse direction, adanal setae setiform in protonymph, biramous in tritonymph.

*Adult* (Figs 15-24): Total body size (n=9): 270 (255-295) x 188 (180-190), length of notogaster 181 (170-200, 64-71% of total body length). Color dark yellow to light brown. Prodorsal and major part of notogastral surface (except lateral plates *L*) covered with irregular polygonal network surrounded by smaller and larger elevated areolae, surface granulate (Fig. 18). Lateral plates *L* granulate, with longitudinal striae (Fig. 17). Mentum, epimeral, genital and ano-adanal plates with granulate surface.

Prodorsum (Fig. 15): Shape almost quadrangular, anterior edge rounded. Rostrum medially with a nose-shaped protuberance, slightly protruding anteriorly beyond anterior margin of prodorsal shield. Rostral, lamellar, interlamellar (Fig. 19) and anterior exobothridial setae biramous, papillate ("T-shaped" in the sense of Wallwork, 1960), both rami almost equal in length, extension of both rami: *ro* 40-45, *le* 45-50, *il* 30-35, *exa* 12-15. Papillae of *ro*, *le*, *il* 3-5 long. Posterior exobothridial

setae (*exp*) lateral to bothridia, curved, uniramous, papillate, directed laterad to anterodorsad, 10 long. Bothridia directed laterad, head of sensilli with anterodorsad directed papillae, total length of sensilli 50, head 40. Posterior edge of prodorsum sclerotized.

Notogaster (Fig 15): Shape almost round. Broad transverse scissure (of type "L" in the sense of Grandjean, 1947; see Norton, 2001) present between plates *Na* and *Py*, curved anteriorly. Anterior part of plate *Py* covered by hypertrophied posterior part of plate *Na* (overlapping part 27-50 long\*), hiding insertions of setal row *d* on scissure. Indistinct thickened transverse suture present anterior to setal row *e*, not visible in all studied specimens. On ventral side a single transverse scissure present anterior to plate *Py* towards ano-adanal plate, and a straight longitudinal scissure present on each side between plates *Is* and *L*.

Sixteen pairs of notogastral setae present. Setae *d* very short, setiform, smooth, 2-3 long, hardly visible under plate *Na*. Other notogastral setae biramous, papillate. Rami of setal row *c* aligned in diagonal to longitudinal direction, slightly asymmetric with shorter anterior rami, extension of both rami 30-45, rami of setae *e* (Fig. 20) and *f* aligned transversely, extension of both rami 20-30, setae *h*<sub>1</sub>-*h*<sub>3</sub> on edge of notogaster, extension of both rami 30-35, setae *ps*<sub>1</sub>-*ps*<sub>3</sub> visible in lateral and ventral view, extension of both rami: *ps*<sub>1</sub> 25-30, *ps*<sub>2</sub>, *ps*<sub>3</sub> 20-25, *ps*<sub>2</sub> and *ps*<sub>3</sub> inserting on plates *Is* lateral to ano-adanal plates.

Gnathosoma (Figs 17, 22, 23): Mentum small (25 x 20-25), subcapitular setae attenuating, setae *h* inserting on posterior part of mentum, directed posteriad, *h*, *m*<sub>1</sub>, *m*<sub>2</sub> 5-10, *a* 15-20 long. Three pairs of adoral setae present, ~10 long. Chelicerae (Fig. 22) narrow, size (n=4): 45-55 x 16-20, movable digit 13-17 long, both setae directed anteriorly, *cha* setiform, ciliate, 15-20 long, *chb* strongly thickened, palmate, 12-15 long, with 4-6 fingers. Palps (Fig. 23) with 5 short articles, total length 40-50. Setal formula (trochanter to tarsus, solenidium in parentheses) 0 - 2 - 1 - 3 - 11(1), *cm* 50 long, *acm* flagelliform, with a distal loop, 30-35 long, setae (*lt*) 15-20 long, seta *l'* pectinate with ciliae at right angle. Setae (*ul*) and *sul* eupathids, (*ul*) fused, bifid with two short spines.

Epimeral region (Fig. 17): Epimeral plates I and II separate, plates III and IV almost completely fused on each side. Epimeral setal formula 3-2-3-4, setae *3c* inserting on anteriorly directed apophyses, *4b*, *4c*, *4d* in one row on posterior part of plate. Setae attenuating, on plates I and II ciliate, 10-15 long, on plates III and IV smooth, 6-10 long.

Genito-anal region (Figs 17, 21): Genital plates small, shape oval, surface granulate, almost spiculate. Eight pairs of genital setae present, attenuating, 8-12 long. Anal and adanal plates fused. Four pairs of anal setae present (Fig. 21), basally thickened, distally attenuating, curved mediad and posteriad, 8-12 long. Four pairs of adanal setae present (Fig. 21), biramous with ciliae, extension of both rami 12-15, ciliae 2-3 long. Bases of adanal setae connected by a sclerotized ridge.

Legs (Fig. 24): Legs of moderate length (without claws 35-46% of body length). Setal formula of legs (trochanter to tarsus, solenidia in parentheses): leg I (Fig. 24) 0 - 4 - 4 - 6(1) - 19(3), leg II 1 - 5 - 4 - 6(1) - 17(2), leg III 2 - 3 - 3 - 4(1) -

\*The degree of overlap of the hypertrophied posterior part of plate *Na* depends on the way of preparation. When squeezed, the plates move apart and the transverse scissure becomes uncovered. In this position setae *d* are well visible.

12, leg IV 2-3-3-4(1)-11. All legs heterotridactylous, with a small, but strong medial claw and two weaker lateral claws, claws 20-30 long. Setae *d* and *l'* on femur I and setae *d* of femora II and III uniramous, papillate, setae *d* on femur IV thickened with short ciliae. Solenidia  $\omega_1$  on tarsus I curved anteriad, 25 long, solenidia  $\varphi_1$  on tibia I very long (70-90), inserted on large distal projection.

*Immatures* (Figs 25, 26): Color pale. Size: protonymph (n=1): 190 x 130, notogaster 130 long, tritonymph (n=1): 260 x 170, notogaster 170 long. Surface structure of both instars as in adult, in protonymph surrounding areolae very small.

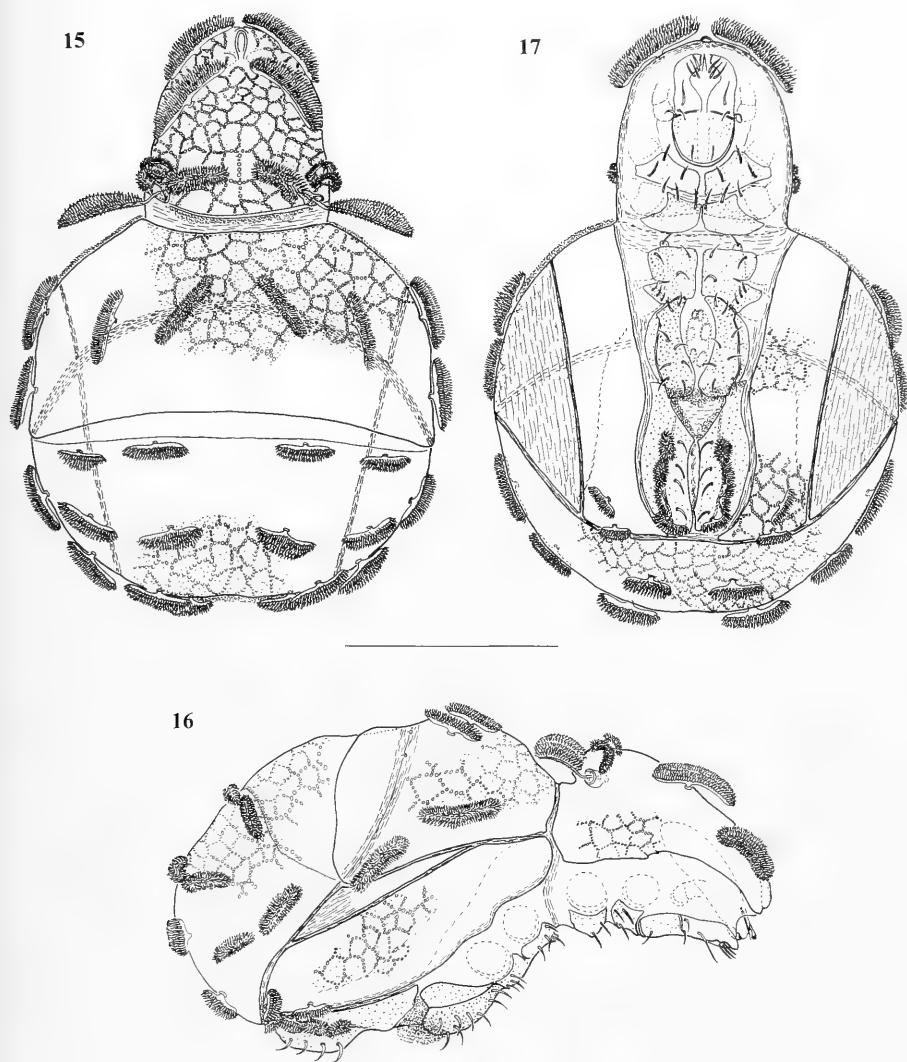
Prodorsum (Fig. 25): Nose-shaped structure as in adult in both instars. Shape of prodorsal setae as in adult, extension of both rami *ro*, *le* 30-35, *exa* 12-15, *exp* 10 long in tritonymph; extension of both rami *ro*, *le* 20, *il* 15, *exa* 12, *exp* 7 long in protonymph. Total length of sensilli 50, head 40 in tritonymph; length of sensilli 25, head 20 in protonymph.

Gastronotic region (Figs 25, 26): Broad dorsal scissure between plates *Na* and *Py* present as a well-developed sulcus. Lateral plates *L* triangular, surface granulate with radial striae, inner margin with a series of folds. In both instars sixteen pairs of gastronotic setae present, setae *c<sub>1</sub>-c<sub>p</sub>* biramous, papillate, slightly asymmetric, extension of both rami 25-35 in tritonymph; setae *c<sub>1</sub>-c<sub>p</sub>* biramous, ciliate, slightly asymmetric, extension of both rami 15-20 in protonymph. Setae *d* on anterior slope of cavity, very short, setiform, smooth, 2 long in tritonymph; 1-2 long in protonymph, hardly visible in between the surface microstructure. Pygidial plate *Py* with two transverse ridges, setal row *e* on anterior, row *f* on posterior ridge, rami of setae *e*, *f* directed transversely in both instars, setae *h* and *ps<sub>1</sub>* on lateral edge of notogaster, setae *ps<sub>2</sub>* and *ps<sub>3</sub>* on plate *Is*. All posterior setae biramous, papillate, extension of both rami 15-20 in tritonymph; biramous, ciliate, extension of both rami 10-15 in protonymph.

Gnathosoma: Number of subcapitular and adoral setae of both instars as in adult. Size of chelicera 50 x 17 in tritonymph, setae *cha* 15, *chb* 10 long, palmate, with 4 fingers in tritonymph; chelicera of protonymph not studied. Palp: setal formula of both instars of both instars as in adult, setae *cm* 45 long in tritonymph, 22 in protonymph, setae *acm* without loop in both instars, length 27 in tritonymph, 15 in protonymph, eupathidial setae (*ul*) fused, bifid, setae *l'* pectinate with ciliae at right angle in both instars.

Ventral region (Fig. 26): Shape of epimeral plates, position, number and shape of epimeral setae in tritonymph as in adults, setae 5 long. Epimeral setal formula 2-1-2?-2? (not well studied due to folded legs) in protonymph, setae 4-5 long. Genital plates with 6 pairs of setae, setiform, 7 long in tritonymph; 1 pair of genital setae, setiform to spiniform, 4 long in protonymph. Anal and adanal plates fused, 4 pairs of setiform anal setae and 4 pairs of biramous, ciliate adanal setae present, extension of both rami 6-8 in tritonymph; no anal setae, 4 pairs of setiform adanal setae, 4-5 long in protonymph.

Legs: All legs monodactylous, setal formula not studied in detail, setae *d* and *l'* on femur I, setae *d* on femora II - IV thickened, papillate in tritonymph; setae *d* on femora I and II thickened and ciliate in protonymph. Solenidium  $\varphi_1$  on tibia I 80 long in tritonymph, 55 long in protonymph.

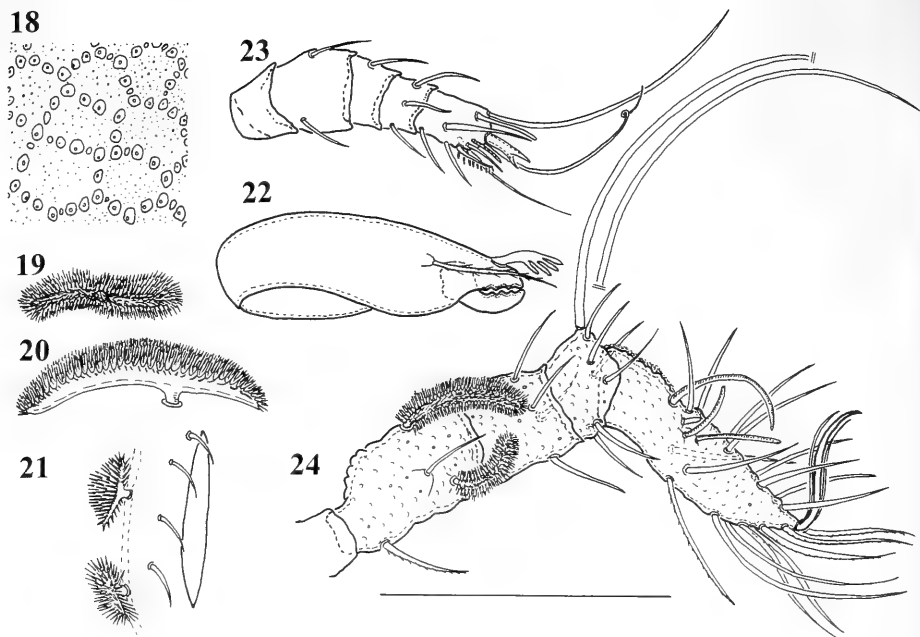


FIGS 15-17

*Sphaerochthonius windsori* sp. n., adult - 15. Dorsal view; 16. Lateral view; 17. Ventral view (Scale: 100  $\mu$ m).

**Eggs:** Several females observed with one or two large eggs. Dimensions of eggs ( $n=6$ ) 107-125 x 70-100, shape of eggs oval to elliptic. Eggs mostly in longitudinal orientation, except in one female in transverse orientation in posterior part of notogaster. Surface and edge of eggs appearing smooth inside the notogaster, but not studied in detail.

**Variation:** One adult specimen from Isla Taboga with 9 genital setae on one side.



FIGS 18-24

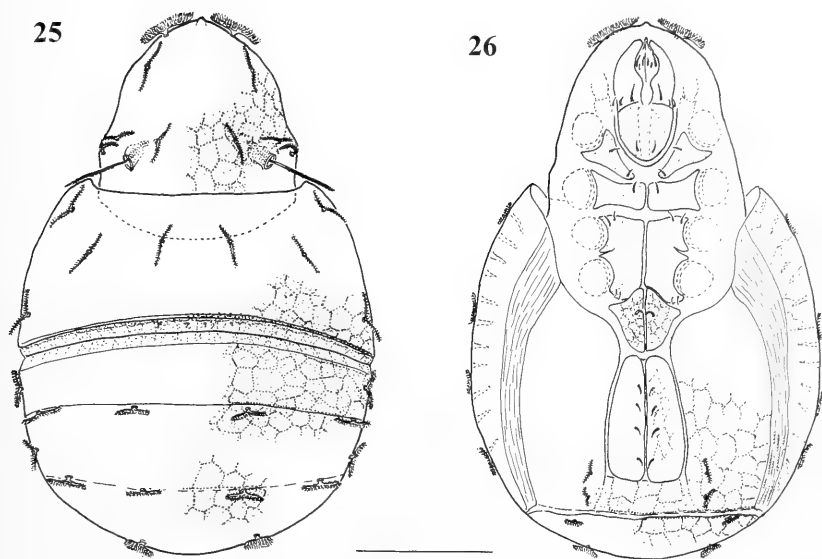
*Sphaerochthonius windsori* sp. n., adult - 18. Surface structure of prodorsum and notogastral plates  $Na$ ,  $Py$ ; 19. Seta  $il$ ; 20. Seta  $e_1$ ; 21. Anal and posterior adanal setae; 22. Chelicera; 23. Pedipalp; 24. Leg I. All appendages in abaxial aspect (Scale: 50  $\mu$ m).

**Etymology:** The new species is gratefully dedicated to Dr Donald M. Windsor, Smithsonian Tropical Research Institution, Rep. Panamá, for his hospitality and continuous support of our expeditions in Panamá.

**Remarks:** The new species is similar to studied specimens of *Sphaerochthonius splendidus* (Berlese, 1904) in having a polygonal surface structure, biramous setae on prodorsum and notogaster, and in possessing the same number of anal and adanal setae. Differences between the two species are found in: presence of a nose-shaped structure on prodorsum in *S. windsori*, shape of notogastral setae  $c_1$ ,  $c_2$ , rows  $e$  and  $f$  (*windsori*: biramous, subequal in length, *splendidus*: biramous, strongly asymmetric with short anterior rami), alignment of rami of setal rows  $e$  and  $f$  (*windsori*: transverse, *splendidus*: longitudinal), details in surface structure (*windsori*: large and round elevated areolae, forming edges of polygonal network, *splendidus*: clearly outlined polygons, areolae absent or small). *Sphaerochthonius splendidus* has a wide circumtropical and -subtropical distribution and was also frequently found in Panamá by the author.

The tritonymphs of *Sphaerochthonius windsori* sp. n. differ from the adult instar by the smaller posterior edge of plate  $Na$ , leaving the scissure uncovered; by the presence of additional transverse ridges along setal rows  $e$  and  $f$  (the anterior is present as an indistinct suture or totally reduced in adults); by the number of epimeral, genital, and anal setae; and by the number of claws (see also remarks on *S. litoralis* sp. n.).





FIGS 25-26

*Sphaerochthonius windsori* sp. n., protonymph - 25. Dorsal view; 26. Ventral view (Scale: 50  $\mu$ m).

**Ecology and distribution:** The few finds of *Sphaerochthonius windsori* sp. n. indicate a preference for arid conditions. The species was not recorded in other sites, although more than 300 samples were taken by the author in different regions and habitats in Panamá (Schatz, 1997).

#### KEY TO KNOWN NEOTROPICAL *SPHAEROTHONIUS* SPECIES

- 1 Setae of rows *e, f, h* on posterior notogastral plate uniramous, 4 pairs of adanal setae ..... 2
- Setae of rows *e, f, h* on posterior notogastral plate biramous ..... 4
- 2 Setae of rows *e, f, h* on posterior notogastral plate long, notogaster with reticulate surface structure ..... 3
- Setae of rows *e, f, h* on posterior notogastral plate short, fungiform, notogaster with foveolate surface structure ..... *S. fungifer* Mahunka, 1983 (Guatemala, Tikal)
- 3 Setae of rows *e, f, h* on posterior notogastral plate broad, phylliform ..... *S. phyllophorus* Balogh and Mahunka, 1969 (Brazil, Rio de Janeiro)
- Setae of rows *e, f, h* on posterior notogastral plate long, small, papillate ..... *S. uruguayensis* Pérez-Iñigo and Sarasola, 1998 (Uruguay)
- 4 Anterior notogastral setae (row *c*) biramous, T-shaped, both rami of almost equal length ..... 5
- Anterior notogastral setae (row *c*) biramous, T-shaped, strongly asymmetrical, anterior ramus much shorter than posterior one, setae of rows

- e, f, h* on posterior notogastral plate also asymmetrical, 4 pairs of adanal setae . . . . . *S. splendidus* (Berlese, 1904) (Galápagos Islands, Central America, Holarctic region, Australia)
- 5 5 pairs of adanal setae . . . . . 6
- 4 pairs of adanal setae, notogaster with irregular reticulate surface structure surrounded by elevated areolae . . . . . *S. windsori* sp. n. (Panamá)
- 6 Prodorsum with nose-shaped protuberance, reticulate surface structure on notogaster with small triangles in angles, adanal setae widely branching . . . . . *S. litoralis* sp. n. (Galápagos Islands)
- Prodorsum without nose-shaped protuberance, reticulate surface structure on notogaster irregularly surrounded by areolae, adanal setae biramous, inner rami short . . . . . *S. transversus* Wallwork, 1960 (Ghana; records in Neotropical region doubtful)

## ACKNOWLEDGEMENTS

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## Una nuova specie di *Otiorhynchus* Germar, 1822 del Pakistan (Coleoptera, Curculionidae, Polydrusinae) \*

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**A new species of *Otiorhynchus* Germar, 1822 from Pakistan (Coleoptera, Curculionidae, Polydrusinae).** - *Otiorhynchus* (*Melasemnus*?) *lepidus* sp. n. is described, belonging to the section 3 of the system proposed recently by the author. The epipleura slightly bent at the level of the hind coxae do not make possible a satisfactory placement, since the new species has no affinity with any subgenus of this section. *O. lepidus* shares the above character with *O. relicinus* Arnoldi, 1975 from Altai. The new species may belong to a new genus which has not been described waiting for a more abundant material from the areas at the border of the known range of *Otiorhynchus*.

**Key-words:** New species - Curculionidae - Polydrusinae - *Otiorhynchus* - Pakistan.

### INTRODUZIONE

Fra il materiale recentemente studiato del Muséum d'histoire naturelle di Ginevra (Svizzera) (MHNG) ho trovato una nuova specie che provvisoriamente ascrivo al genere *Otiorhynchus* e qui di seguito descrivo.

### MATERIALI E METODI

Il presente studio si basa sull'esame di cinque esemplari del Pakistan, conservati nella collezione entomologica del Museum d'histoire naturelle di Ginevra (MHNG).

***Otiorhynchus* (*Melasemnus*?) *lepidus* sp. n.**

Figg. 1-5

Materiale esaminato: Holotypus ♂, Pakistan, Swat, Kalam, 2100 m, 17.v.1983, Besuchet-Löbl (MHNG). Paratypi: 1 ♂, Pakistan, Swat, Kalam, 2100 m, 17.v.1983, Besuchet-Löbl; 1 ♂, 1 ♀, Pakistan, Swat, vallée d'Ushu, 2300 m, 15.v.1983, Besuchet-Löbl, (MHNG). 1 paratypus ♂, Pakistan, Swat, Kalam, 2100 m, 17.v.1983, Besuchet-Löbl nella collezione dell'autore.

Diagnosi. Un *Otiorhynchus* appartenente alla sezione 3 dell'attuale sistema (Magnano, 1998), ma con epipleure curve al livello delle anche posteriori e con nessuna affinità con i sottogeneri ad essa pertinenti. La specie è ascritta provvisoriamente al sottogenere *Melasemnus*.

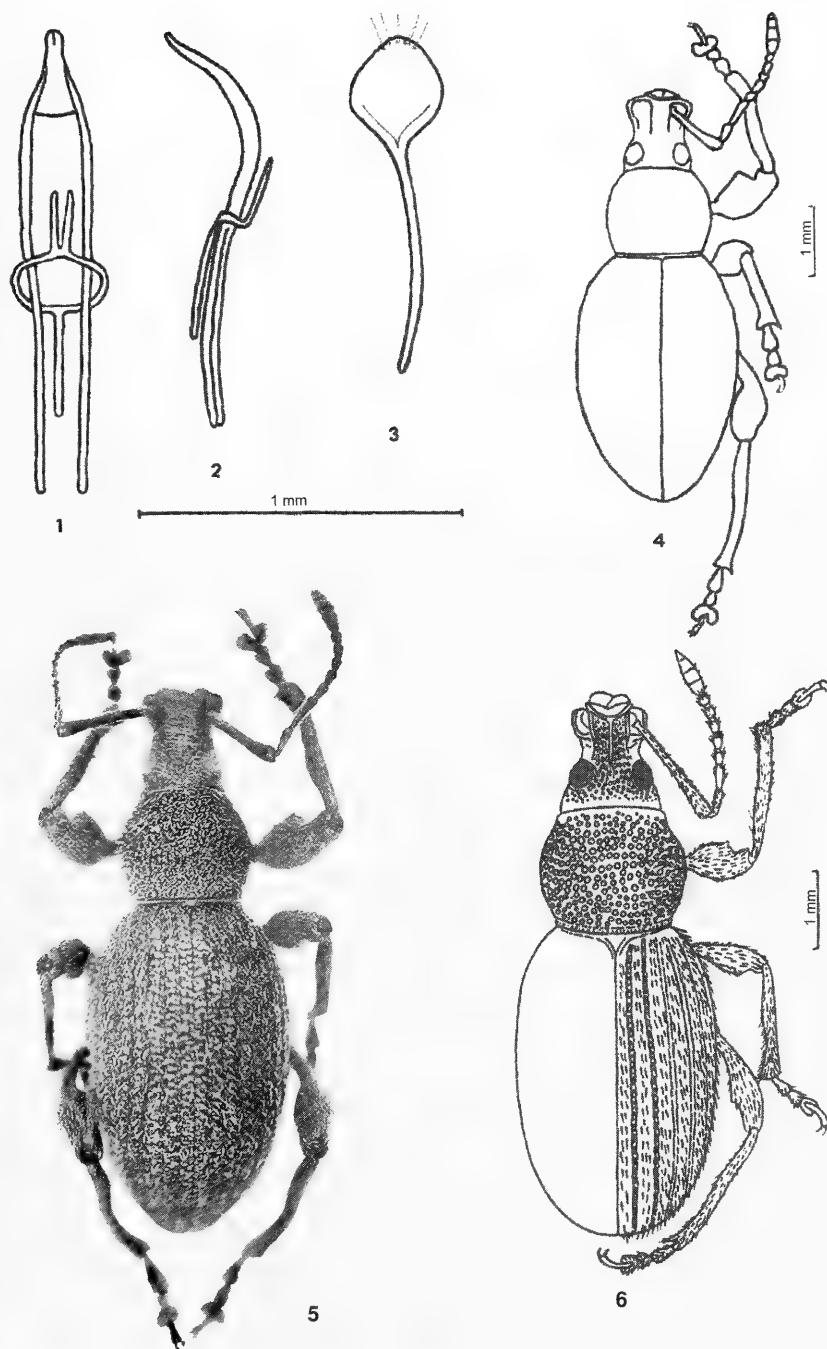
\* XLVI contributo alla conoscenza dei Curculionidi.

Manoscritto accettato il 06.11.2002

Descrizione dell'holotypus ♂. Lunghezza (protorace più elitre): 5,5 mm; larghezza massima delle elitre: 2,6 mm. Colore castano. Rostro, compresi gli pterigi arrotondati all'esterno, lungo quanto largo; epistoma subtriangolare, fronte ripiegata in avanti e appena distinta dall'epifronte, la quale ha i lati subparalleli ed è larga quanto il rostro al livello della inserzione delle antenne. Scrobe semiaperte in avanti, all'indietro terminanti alla metà della distanza fra gli occhi e l'inizio della dilatazione delle scrobe. Rostro separato dal capo da una lieve depressione trasversale davanti agli occhi. Capo due volte più largo che lungo, occhi grandi: il loro diametro maggiore è appena più stretto della distanza interoculare. Epifronte percorsa lungo la linea mediana da una carena appena accennata. Scultura del capo e del rostro costituita da granuli con un'area centrale che occupa la parte apicale, dov'è inserita una setola lunga tre volte il suo diametro. Scapo diritto, di grossezza pressoché uguale dalla base fino ai 2/3, poi ingrossato a clava; primo antennumero due volte più lungo che largo all'apice, clavi-forme; secondo 3,5 volte più lungo che largo all'apice e appena più ingrossato nella parte apicale; terzo 1,5 volte più lungo che largo all'apice; 4°-7° 1,3 volte più lunghi che larghi e tutti a tronco di cono. Clava fusiforme allungata, poco più lunga degli ultimi quattro antennumeri e 3,3 volte più lunga che larga, articolo basale a forma di cono. Protorace 1,2 volte più largo che lungo, regolarmente arrotondato ai lati, orlo anteriore appena più stretto dell'orlo basale, scultura con granuli ombelicati piccoli e fitti un po' più piccoli ai lati, sul disco misti ad areole nella metà apicale. Pubescenza come sul capo e rostro, diretta verso la linea mediana. Elitre ovali, con la massima larghezza nel terzo basale; strie composte da una serie di areole piccole ma ben evidenti, separate da un granulo della metà più piccolo del loro diametro. Interstrie del doppio più larghe delle strie, con granuli un po' più grandi di quelli del pronoto e leggermente schiacciati sul disco; le interstrie laterali e le altre sulla declività posteriore con granuli convessi poco fitti e disposti in una serie. Epipleure appena smarginate al livello delle anche posteriori. Vestitura composta da setole all'interno delle areole aventi la loro stessa lunghezza. Interstrie con due serie di setole curve, appena sollevate dal tegumento e appena più lunghe di quelle del protorace, del rostro e del capo. Femori clavati, con un piccolo dente spiniforme, nei profemori seguito da uno o due granuli minuti; orlo esterno delle protibie retto nei 2/3 basali, poi leggermente curvo all'interno, parte interna bisinuosa, la prima concavità termina nei 2/3 basali, quella apicale porta tre spine, i loro intervalli crenulati. Meso e metatibie come le protibie, ma le incisive e i denti meno evidenti. Metatibie leggermente curve all'interno. Tarsomeri 1 e 2 di uguale lunghezza, terzo profondamente bilobo, onichio lungo il doppio del terzo tarsomero, unghie libere. Metasterno e urosterni con areole fitte e profonde, piccole, distanti fra loro della metà del loro diametro sulle quali è inserita una setola 3 volte più lunga del loro diametro. Metasterno e primo urosterno apparente profondamente incavati. Edeago e habitus come in figg. 1, 2, 4, 5.

I paratipi non si differenziano sostanzialmente dall'olotipo. La ♀ ha le elitre più larghe. Spiculum ventrale come in fig. 3.

Osservazioni. *O. lepidus* non presenta affinità con alcuna specie nota. Al taxon è quindi stata data una collocazione assolutamente provvisoria perché esso, pur presentando i caratteri della terza sezione dell'attuale sistema (Magnano, 1998), ha le epipleure leggermente curve al livello delle anche posteriori, carattere che appartiene



FIGG. 1-6. — 1-5: *Otiorhynchus (Melasemnus?) lepidus* sp. n. 1: edeago in visione dorsale; 2: edeago in visione laterale; 3: spiculum ventrale; 4: ♂, habitus, schematico; 5: habitus. — 6: *Otiorhynchus relicinus* habitus, schematico, da Arnoldi, 1975.

agli altri generi del complesso *Otiorhynchus* Germar, 1822 e alle sezioni 1, 2 e 4. La nuova specie potrebbe appartenere ad un nuovo genere che per il momento, per scarsità di materiale, si è preferito non descrivere. Anche *Otiorhynchus relicinus* Arnoldi, 1975 dell'Altai ha le epipleure leggermente curve al livello delle anche posteriori. Si noti che Arnoldi (1975) non ha collocato la specie in nessun gruppo allora descritto. Vale la pena notare che queste specie sono presenti nella parte centro-meridionale dell'area di distribuzione del genere *Otiorhynchus*. La tribù Otiorhynchini, ed in particolare il genere *Otiorhynchus*, necessitano di una profonda revisione per fare un minimo di chiarezza nella loro sistematica. A questo riguardo la fauna delle regioni himalayana e centroasiatica meritano una particolare attenzione perché possono portare un notevole contributo alla conoscenza della tribù. Il carattere delle epipleure leggermente curve al livello delle anche posteriori condiviso da *O. relicinus* (fig. 6) e *O. lepidus* (fig. 4) è una pura convergenza. Non conosco in natura *O. relicinus*, ma il confronto delle figg. 4 e 6 rende evidente il fatto che si tratta di due entità completamente differenti appartenenti probabilmente a due generi diversi.

Derivatio nominis. *Lepidus* = grazioso.

Distribuzione geografica: Pakistan nord orientale.

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## Two new species of the genus *Quedius* from Algeria and Pakistan (Coleoptera: Staphylinidae: Staphylinini: Quediina)

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**Two new species of the genus *Quedius* from Algeria and Pakistan (Coleoptera: Staphylinidae: Staphylinini: Quediina).** - The new species *Quedius (Microsaurus) asphaltinus* from Pakistan, and *Quedius (Raphirus) boreoafricanus* from Algeria are described, illustrated and compared to related species.

**Key-words:** Taxonomy - new species - Coleoptera - Staphylinidae - Algeria - Pakistan.

### INTRODUCTION

The genus *Quedius* Stephens, 1829 comprises almost 800 species occurring in all zoogeographical regions of the world.

Palearctic species (about 500) live usually in forest floor litter, leaf litter, around bases and in hollows of old trees, under hay heaps etc. Some species prefer caves, watersides, swamps, ant hills and underground nests of insects or various little mammals.

Two new species were found among the material from the collection of the Muséum d'histoire naturelle Genève and from some private collections. The descriptions follow below. All measurements in the descriptions are given in millimeters.

### TAXONOMICAL PART

***Quedius (Microsaurus) asphaltinus* sp. n.**

Figs 1-2

*Type material.* Holotype ♀: "Pakistan, NW Frontier Prov., Nathiagali (20 km N Murree), 34.04 N/73.24 E, 2400 m, J. Kaláb leg., 9.-11.viii.2000". In the collection of the National Museum Prague, Czech Republic.

*Description.* Female. Length 12 mm. Black, abdomen inconspicuously iridescent; front tibia, apex of tarsi as well as apex of abdomen somewhat paler.

Head of obtusely quadrangular shape, wider than long (length/width=1,81/1,97), slightly arcuately narrowed to neck, posterior angles indistinct; frons behind antennal insertions with shallow triangular impression. Eyes small and rather flat, hardly protruding from lateral contours of head, tempora longer than eyes seen from above (0,81/0,66); no additional setiferous punctures between anterior frontal punctures; posterior frontal puncture situated closer to posterior margin of eye than to posterior margin of head, two smaller consecutive setiferous punctures between it and

posterior margin of head; temporal puncture closer to posterior margin of head than to posterior margin of eye, no fine punctures behind temporal puncture; surface of head with very fine and dense microsculpture of mostly transverse waves and with scattered sparse micropunctulation.

Antenna moderately long, segment 3 longer than segment 2 (0,34/0,25), segment 4 and 5 about as long as wide, segments 6-10 wider than long (gradually becoming wider and shorter), segment 11 slightly shorter than two preceding segments combined.

Pronotum wider than long (length/width=2,19/2,44) widest behind middle, basal margin broadly rounded, lateral portions not explanate, distinctly narrowed anteriorly; dorsal rows each with three punctures, sublateral rows each with two punctures, posterior puncture situated distinctly before level of large lateral puncture; surface of pronotum with microsculpture similar to that on head, micropunctulation finer.

Scutellum impunctate, surface with very dense and fine microsculpture of transverse waves, apical half with some scattered micropunctures.

Elytra about as long as wide (length/width=2,69/2,66), at base narrower than pronotum at widest point, slightly widened posteriorly, at sides distinctly longer (2,56/2,19), at suture hardly longer (2,31/2,19) than pronotum at midline; punctation coarse, sparse and markedly unevenly dispersed, interspaces glossy with scattered points (Fig. 1).

Abdomen with tergite 7 bearing a distinct, whitish apical seam of palisade setae; punctation of tergites finer and much denser than that on elytra, rather uniform toward apex of abdomen. Genital segment with tergite 10 short and wide, markedly narrowed toward apex (Fig. 2).

Pubescence of elytra and abdomen piceous black, uniform.

Front tarsi slightly dilated, segment 2 about as wide as apex of tibia.

Male. Unknown.

*Comparison.* *Quedius asphaltinus* belongs by the body shape, the chaetotaxy of the head and the pronotum and the dark colouration near *Q. (Microsaurus) mesomelinus* (Marsham, 1802). It can easily be distinguished by its larger size and by the conspicuous punctation of the elytra.

In the Near East occurs another robust species with very sparse punctation of elytra - *Q. fagelianus* Coiffait, 1967. It belongs to the subgenus *Distichalius* Casey, 1915 (elytra with three irregular longitudinal rows of punctures only). It differs from *Q. asphaltinus* apart from the subgeneric characters given above, mainly as follows: palpi, antennae and legs paler, mostly rufobrunneous; head more transverse (l/w ratio about 0,75); only one puncture between posterior frontal puncture and posterior margin of head.

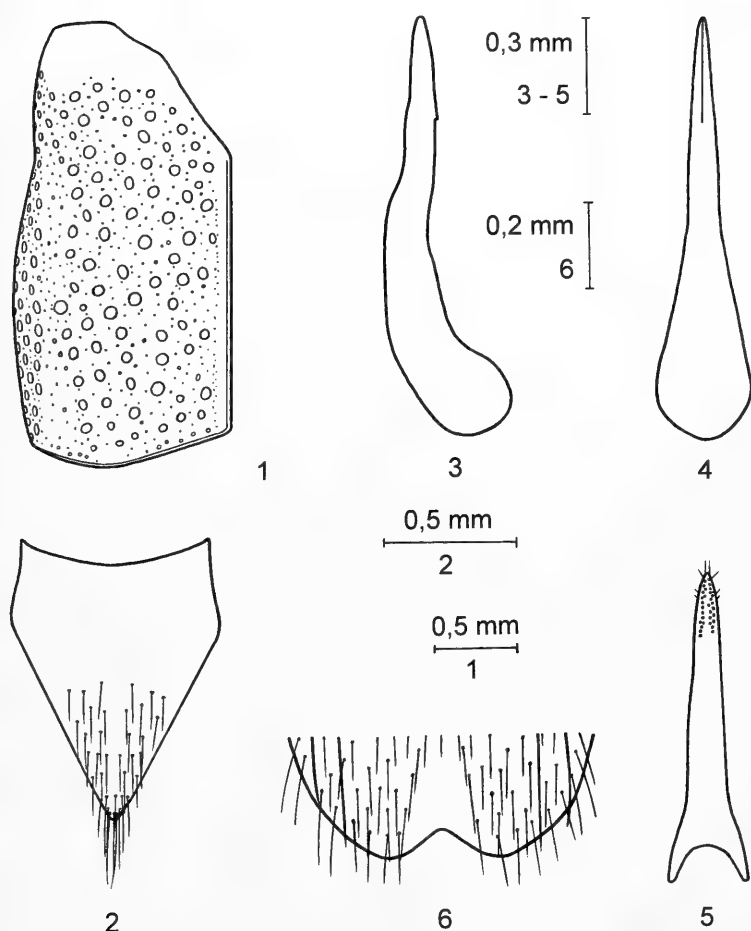
*Etymology.* The specific epithet refers to the deep dark colouration and the relatively shining surface of the body.

### *Quedius (Raphirus) boreoafricanus* sp. n.

Figs 3-6

*Type material.* Holotype ♂: "Algérie: Atlas de Blida, Chréa, Les Glacières, 1100 m, 3.V.1988, Besuchet-Löbl-Burckhardt". In the collection of Muséum d'histoire naturelle Genève, Switzerland.





FIGS 1-6

1 - 2: *Quedius (Microsaurus) asphaltinus* sp. n. (holotype ♀): 1 - punctation of left elytra, 2 - female tergite 10. 3 - 6: *Quedius (Raphirus) boreoaffricanus* sp. n. (holotype ♂): 3 - median lobe in lateral view, 4 - median lobe in ventral view, 5 - underside of paramere, 6 - apical emargination of male sternite 8.

**Description.** Male. Length 6,5 mm. Head dark brown; pronotum piceous brown with lateral portions and anterior angles paler; elytra testaceous, sutural area narrowly darkened; abdomen dark brown, iridescent. Antennae and palpi testaceorufous; bases of antennae, legs and apical portions of abdominal tergites testaceous.

Head rounded, about as long as wide (length/width=0,88/0,89); eyes large and convex, tempora much shorter than length of eyes seen from above (0,17/0,56); no additional setiferous punctures between anterior frontal punctures; posterior frontal puncture very close to posteromedian margin of eye, one puncture between it and posterior margin of head; temporal puncture touching posterior margin of eye, tempora with some fine punctures; surface of head with dense and very fine microsculpture of

transverse waves gradually becoming irregular toward clypeus and forming numerous meshes there.

Antenna moderately long, segment 3 inconspicuously longer than segment 2 (0,19/0,16), segments 4 and 5 somewhat longer than wide, following segments gradually becoming shorter, segments 7-10 about as long as wide, segment 11 slightly shorter than two preceding segments combined.

Pronotum as long as wide (length/width=1,19/1,19), broadly rounded basally, slightly narrowed anteriorly; dorsal and sublateral rows each with three punctures, posterior sublateral puncture situated behind level of large lateral puncture; surface of pronotum with microsculpture similar to that on head.

Scutellum impunctate, surface with dense and fine microsculpture of transverse waves.

Elytra as long as wide (length/width=1,44/1,44), at base hardly narrower than pronotum at widest point, slightly widened posteriad, at sides longer (1,38/1,19), at suture about as long as pronotum at midline; punctation fine and somewhat not uniform, longitudinal interspaces between punctures two times larger than diameters of punctures, transverse interspaces about as wide as diameters of punctures, surface between punctures without microsculpture.

Abdomen from tergite 4 narrowed toward apex, tergite 7 with distinct, whitish apical seam of palisade setae; punctation of tergites finer and slightly denser than that on elytra. Sternite 8 with triangular emargination (Fig. 6), shape of tergite 10 and sternite 9 very similar to that of other species in the *Q. nemoralis* X *humeralis*-group.

Pubescence of elytra and abdomen brownish and uniform.

Front tarsi slightly dilated, segment 2 about as wide as apex of tibia. Right middle tibia with tarsi is missing.

Aedeagus relatively narrow and elongate, his shape in Figs. 3-5.

Female. Unknown.

*Comparison.* The new species belongs to the *Q. nemoralis* X *humeralis*-group, but only two species of it occur in North Africa - *Q. humeralis* Stephens, 1832 and *Q. pauliani* Koch, 1941. The aedeagus of *Q. pauliani* is very similar to that of *Q. nemoralis* Baudi, 1848 (median lobe spoonshaped in ventral view). The aedeagus of *Q. boreoaffricanus* resembles more that of *Q. humeralis*, but it differs mainly in the very long apical keel of the median lobe (about 2,4 times longer than that of *Q. humeralis*); the apical portion of median lobe is narrow, but not pointed in ventral and lateral views and the paramere is slightly wider and less pointed (see Coiffait 1978, Fagel 1968).

*Etymology.* The specific epithet refers to the occurrence of the species in North Africa.

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## **Zoogeography in southern Japan as revealed by ground-living arachnids**

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**Zoogeography in southern Japan as revealed by ground-living arachnids.** - In the past, primarily birds and butterflies, but also amphibians, reptiles and mammals, have been used for zoogeographic studies in southern Japan. Meanwhile, taxonomic studies have also been carried out on arthropod groups living in and on the soil. Since it is quite unlikely that these ground-living organisms have crossed the sea, either actively or passively, they are ideal for zoogeographic studies. The present investigations are based on four groups of ground-living arachnids: whipscorpions and spiders (Hexathelidae, Ctenizidae, Mesothelae). A close zoogeographical connection was found between the Yaeyama Islands and nearby Taiwan. The central and northern parts of the Ryukyu Islands are faunistically closest to Kyushu. No distinct border between an Oriental and a Palaearctic fauna can be detected. Instead, only climatic and other ecological factors appear to be responsible for distributional boundaries of various organisms observed in different regions of southern Japan. Similarities to the fauna of continental China can be explained by land connections between the Ryukyus and the continent during the Pleistocene.

**Key-words:** Arachnida - zoogeography - Uropygi - Mesothelae - Hexathelidae - Ctenizidae - Japan - Taiwan.

## **INTRODUCTION**

According to differences in the possibilities of distribution of species concerned, conclusions can be drawn about their origin from geographic refugia during the ice ages. More easily distributing species can expand their ranges more quickly and effectively. With every typhoon, flying species like birds or butterflies are brought north, both welcomed by excited birdwatchers and butterfly collectors, but in general none of these stray species is able to establish permanent footholds farther north. This is certainly due to climatic and maybe also other ecological reasons. There may be no more suitable free ecological niches available.

Several attempts have been made to establish zoogeographic lines in southern Japan, mostly based on the distribution of insects (the Miyake Line south of Kyushu)

(Ezaki, 1929), on the distribution of amphibians, reptiles and mammals (the Watase- or Aoki Line at the Tokara trench) (Okada & Koba, 1931; Hikida *et al.*, 1992; Hikida & Ota, 1997) or on the distribution of insects and birds (the Hachisuga Line at the Kerama trench) (Paik, 1953). Such efforts date back to Watase (1912), who distinguished three zoogeographic areas in the region: 1) Taiwan (and the Ryukyus), 2) the region of Satsuma extending from Kyushu up to central Honshu, and 3) northern Honshu and Hokkaido.

While previous studies have concentrated on the groups of animals mentioned before, species living in and on the ground are much less likely to migrate or to be dispersed passively. Consequently, they are better suited to mirror the prehistoric biogeographic situation. For this reason, different groups of arachnids, which were revised taxonomically during recent years, were used for the current study.

## MATERIAL AND METHODS

Based on taxonomic studies of Uropygi (see Haupt & Song, 1996), Mesothelae (see Haupt, 1983; Song & Haupt, 1984), the hexathelid genus *Macrothele* (see Shimojana & Haupt, 1998) and the ctenizid genus *Latouchia* (see Haupt & Shimojana, 2001), distribution data have been compiled in order to elucidate the zoogeographic situation in southern Japan. Specimens mentioned are partly deposited in the Muséum d'histoire naturelle of Geneva.

## RESULTS

The following species\* were used for the current study; their distribution as documented by the current knowledge is summarized in fig. 1.

Uropygi: *Typopeltis stimpsoni* (Wood, 1862) (Amamioshima) (Haupt & Song, 1996), *T. stimpsoni* (Amamioshima) (Zoological Museum Moscow, unpubl.), *T. stimpsoni* (Kyushu) (Yoshikura, 1965), *T. stimpsoni* (Izena) (Ikehara & Shimojana, 1975).

*Typopeltis crucifer* Pocock, 1894 (Okinawa and Iheya) (Ikehara & Shimojana, 1975), *T. crucifer* (Ishigaki and Iriomote) (Haupt & Song, 1996), *T. crucifer* (Taiwan) (Haupt & Song, 1996 and Hungarian National Museum Budapest, unpubl.), *T. crucifer* (Kashoto = Lùdao, Green Island) (Haupt & Song, 1996 and Hungarian National Museum Budapest, unpubl.), *T. crucifer* (Lanyu = Orchid Island) (J. Haupt, unpubl.).

Mesothelae: *Heptathela kimurai kimurai* (Kyushu) (Haupt, 1983), *H. kimurai amamiensis* (Amamioshima) (Haupt, 1983), *H. kimurai yanbaruensis* (Yanbaru, northern Okinawa) (Haupt, 1983), *H. kanenoi* (Tokunoshima) (Ono, 1996), *H. kikuyai*, *H. nishikawai*, *H. yaginumi* (all Kyushu), *H. yakushimaensis* (Yakushima) (Ono, 1998).

*Ryuthela*\* *nishihirai nishihirai* (central and southern Okinawa) (Haupt, 1983), *R. nishihirai ishigakiensis* (Ishigaki and Iriomote) (Haupt, 1983), *R. sasaki* (Kumejima), *R. secundaria* (Kumejima), *R. owadai* (Tokashiki, Kerama), *R. tanikawai* (Iriomote) (Ono, 1997).

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\* Taxonomic note: In the current catalogue of spiders (Platnick, 2002) *Ryuthela* is still synonymized with *Heptathela*. On the other hand I do not support the description of new species instead of subspecies from various islands in the region, for this reason names of *Heptathela* and *Ryuthela* have been used as published originally.

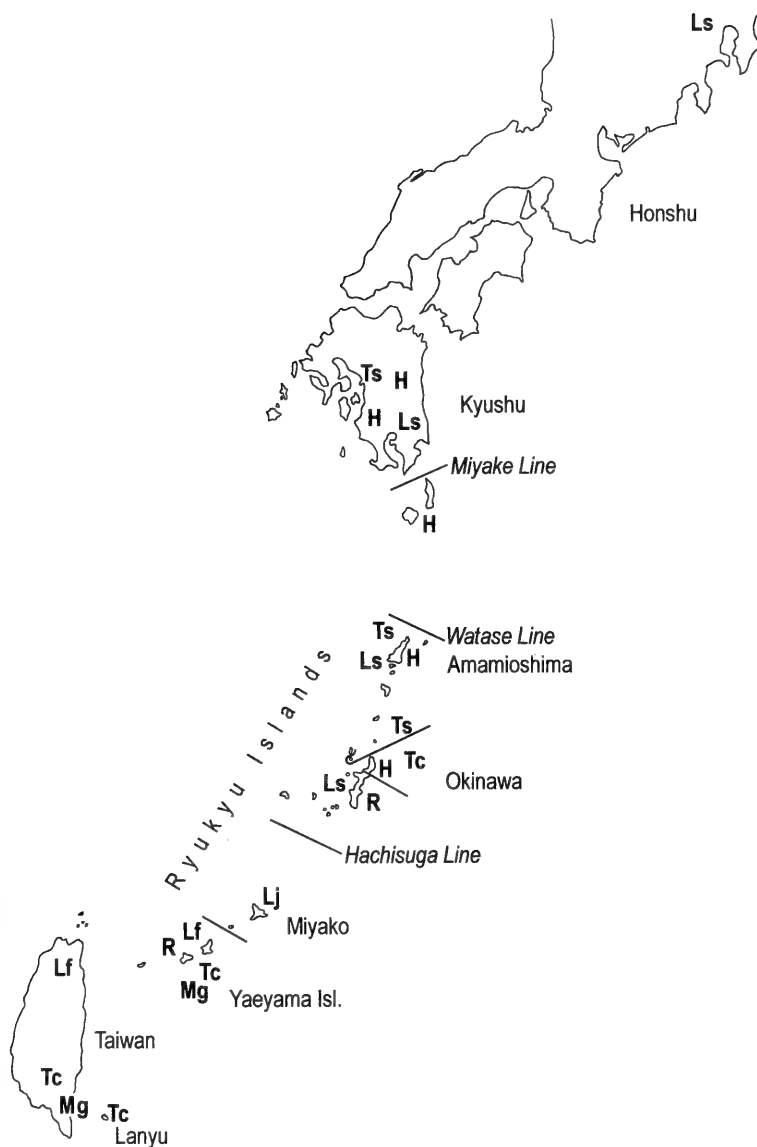


FIG. 1

Distribution of some ground-living arachnids in the Ryukyus and their neighbourhood. Bars indicate the distribution borders between the whipscorpions *Typopeltis stimpsoni* (Ts) and *Typopeltis crucifer* (Tc) (Uropygi: Thelyphonida), *Heptathela* (H) and *Ryuthela* (R) (Araneae: Mesothelae) and subspecies of the ctenizids *Latouchia swinhoei* (Ls) and subspecies of *Latouchia formosensis* (Lf). This border line coincides with the northern distribution of the hexathelid *Macrothele gigas* (Mg) which is also found in Taiwan. The position of *Latouchia japonica* (Lj) remains questionable as the male is still unknown. Note that none of the distribution boundaries coincides with zoogeographical lines established previously.

Ctenizidae: *Latouchia formosensis formosensis* (Taiwan) (Haupt & Shimojana, 2001), *L. formosensis hyla* (Kuroshima, Iriomote) (Haupt & Shimojana, 2001), *L. swinhoei swinhoei* (Okinawa) (Haupt & Shimojana, 2001), *L. swinhoei xena* (Amamioshima, Tokunoshima) (Haupt & Shimojana, 2001), *L. swinhoei crypta* (Kyushu) (Haupt & Shimojana, 2001), *L. swinhoei typica* (Honshu) (Haupt & Shimojana, 2001).

Hexathelidae: *Macrothele gigas* (Ishigaki, Iriomote, Taiwan) (Shimojana & Haupt, 1998; Tso, pers. comm.).

## DISCUSSION

Populations isolated on different islands certainly make their own progress towards speciation. During recent years several new species, e.g., of Mesothelae, have been described from the Ryukyus (Ono, 1996, 1997), showing that *Heptathela* and *Ryuthela* are also present on additional islands such as Tokara, Kerama or Kumejima, respectively. In fact, the description of new island species or the upgrading of subspecies to species level does not affect our interpretation: In this context it is not important whether an insular population has already obtained independent species status or not, because we have to look at the phylogenetic relationships documented by common derived morphological (synapomorphic) characters. Here, we concentrate on genera as mesothelid spiders are concerned, as this clarifies the situation more distinctly.

The continental Chinese mesothelid species are clearly separated from the Japanese and Ryukyuan ones (Song & Haupt, 1984). Although Ono & Nishikawa (1989) tried to link the Japanese *Heptathela kimurai amamiensis* Haupt, 1983 to the Chinese *H. hangzhouensis* Chen, Zhang et Zhu, 1981, the former is more closely related to neighbours in the north (Kyushu) and in the south (Okinawa: Yanbaru), as it shares synapomorphic characters with them. This evaluation is based on the morphology of the female genital plate with its ventrolateral depressions, and on the different parts of the male palpal organ (Haupt, 1983, Song & Haupt, 1984). Therefore the phylogenetic relationships between mesothelid populations on Kyushu and in the northern Ryukyus, including Northern Okinawa (Yanbaru), have to be considered as being closer within each other than with species on the continent (Haupt, 1990). This fact supports the hypothesis that the connection to the continent broke up earlier than the connection between the northern and central Ryukyu islands and Kyushu, which is in accordance with geological data (Kimura, 1996).

Since mesothelid spiders have not yet been recorded from Taiwan (Chen, 1996), they cannot be used to determine the zoogeographical relationship between the Yaeyama Islands (especially Ishigaki and Iriomote) and Taiwan. For this purpose mygalomorph spiders of the families Ctenizidae and Hexathelidae are suitable (fig. 1). They prove a closer zoogeographical connection between Yaeyama and Taiwan. Such relationship (between Yaeyama and eastern Taiwan) has also been reported for the frog *Rana limnocharis* Wiegmann, 1835 (Toda, 1999). In fact these observations are not surprising, as the Yaeyama islands are located rather close to Taiwan. It is known that populations on islands which are in close proximity are also more closely related to

each other than populations from islands farther apart (Mac Arthur & Wilson, 1963). In this context it is surprising that Kimoto (1982), who worked on Chrysomelid beetles, also included Yaeyama as the southernmost Ryukyus, when he stated a close connection between Ryukyus and Kyushu.

While the trench between Okinawa and Miyako (Hachisuga Line) has often been considered as an important dividing line, our results show that this is obviously not the case as far as the arachnids examined are concerned (fig. 1). *Ryuthela* (Mesothelae) and *Typopeltis crucifer* (Uropygi) are transgressing this line concerning their distribution. The distribution of *Typopeltis stimpsoni* and of *Latouchia swinhoi* clearly points to the fact that also the Watase Line (Tokara trench) as well as the Miyake Line have not played any role in the dispersal of these species.

Paik (1953) tried to establish a special biogeographic delimitation linked to the northern distribution of *Heptathela* (Aso Line on Kyushu), but *Latouchia* occurs as far north as Tokyo. As both genera, *Heptathela* and *Latouchia*, share the same lifestyle as trapdoor spiders, this clearly demonstrates the climatic reasons for differences in northern distribution. *Latouchia* may be slightly better adapted to colder climate than *Heptathela*.

Furthermore, the northern and southern distribution boundaries of arachnid species studied do not coincide. The distribution border between *Ryuthela* and *Heptathela* is found in the northern part of Okinawa (Yanbaru) and not between separate islands, although some low-lying parts of Yanbaru were possibly submerged during certain interglacial periods.

Obviously, climatic differences present on the continent are also manifested in the Ryukyu Islands. This is apparently the only possibility to explain the current distribution pattern in various groups of ground-living arachnids. Similarities in the species spectrum between the Ryukyus and the continent can be explained by the pleistocene land connection (Kimura, 1996). Since then the islands were cut off and its fauna undertook a separate development.

## CONCLUSION

To summarise, all these data provide evidence for a transient zone and suggest that there is no distinct border line between the Oriental and the Palearctic fauna in the Ryukyu Islands of southern Japan. Biogeographic lines which were established before and partly mark geological trenches are not supported by the distribution of ground-living arachnids. Their distribution mirrors climatic factors.

## ACKNOWLEDGEMENTS

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## New taxonomic considerations on some species of the genus *Grosphus* Simon, with description of a new species (Scorpiones, Buthidae)<sup>1</sup>

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### New taxonomic considerations on some species of the genus *Grosphus* Simon, with description of a new species (Scorpiones, Buthidae).-

Revised redescrptions are proposed for two closely related species of *Grosphus* Simon, namely: *Grosphus limbatus* (Pocock) and *Grosphus bistriatus* Kraepelin. A new species, *Grosphus ankarafantsika* sp. n. also related with these, is described from the Ankarafantsika Reserve in the Province of Majunga, Madagascar. The morphology of the basal middle lamellae of the pectines is illustrated by using scanning electron microscopy. A revised key to the 11 known species of the genus is presented.

**Key-words:** Scorpions - *Grosphus* - revision - new species - Madagascar - Ankarafantsika Reserve.

## INTRODUCTION

As mentioned in recent papers (Lourenço, 1999, 2001), the first *Grosphus* species to be described was *Scorpio* (*Androctonus*) *madagascariensis* Gervais (1843) = *Grosphus madagascariensis* (Gervais, 1843). This was followed by another isolated description, of *Buthus limbatus* (= *Grosphus limbatus*), by Pocock (1889). Kraepelin (1900) contributed to the study of the genus *Grosphus* with a more important publication in which several species were described. In his comprehensive monograph on the scorpions of Madagascar, Fage (1929) described a new variety of *Grosphus limbatus*, which he named *annulata*. This variety has meanwhile been raised to specific rank as *Grosphus annulatus* (Lourenço, 1996). Several other taxa new to the fauna of Madagascar were described by Lourenço (1995, 1996). The genus *Grosphus*, however, remained more or less stable in its composition. After the publication of Fage's (1929) monograph only three new species were described (Lourenço, 1996, 1999, 2001).

Even though the original descriptions of *Grosphus* species were in most cases quite clear and have been confirmed in subsequent diagnoses (Fage, 1929; Lourenço, 1996), certain characters may require a re-examination. The taxonomy of *Grosphus* is based mainly on two major characters: the pattern of colouration, and the morphology of the basal middle lamellae of the female pectines. For some closely related species,

<sup>1</sup> This study was supported by the Department of cultural affairs, City of Geneva, Switzerland.

such as *Grosphus limbatus* and *Grosphus bistriatus* recent studies (see Lourenço, 1996) were largely based on old and faded material preserved in alcohol. In this material, the patterns of colouration and pigmentation could no longer be observed precisely. In the present study, redescrptions are given for *Grosphus limbatus* and *Grosphus bistriatus*. These redescrptions are based on newly collected material which allows precise observation of the patterns of pigmentation. In addition, the morphology of the basal middle lamella of the pectines is illustrated using scanning electron microscopy. A new species of *Grosphus*, also related with *G. limbatus* and *G. bistriatus*, is described as well.

## TAXONOMIC TREATMENT

REDESCRIPTONS OF *GROSPHUS LIMBATUS* (POCOCK, 1889) AND *GROSPHUS BISTRIATUS* KRAEPELIN, 1900

### *Grosphus limbatus* (Pocock)

Figs 1-2, 9

*Buthus limbatus* Pocock, 1889: 346.

*Grosphus limbatus*; Kraepelin, 1891: 72.

*Grosphus limbatus*; Kraepelin, 1895: 84

*Grosphus limbatus*; Kraepelin, 1899: 33.

*Grosphus limbatus*; Fage, 1929: 653.

*Grosphus limbatus*; Lourenço, 1996: 10.

*Material examined*: Madagascar, Central region, "Massif de l'Ibity", 40 km south of Antsirabe (2254 m), II/III/2000 (F. Glaw & M. Vences coll.): 6 females, 1 female with brood (34 juveniles), 1 female with brood (72 juveniles); II/2001 (G. Garcia Herrero coll): 2 females (badly preserved).

*Coloration*. Basically yellow to reddish-yellow. Prosoma: carapace dark yellowish, with an inverted triangular blackish spot stretching from the median eyes to the lateral eyes; a wide blackish central spot behind the median eyes, fusing with the central blackish band over the mesosomal tergites; lateral margins blackish; eyes surrounded by black pigment. Mesosoma: yellowish with a central longitudinal blackish band over tergites I-VII. Metasoma: segments I-IV reddish-yellow; segment V reddish with dark or blackish zones especially on the ventral aspect. All ventral and latero-ventral carinae marked with blackish spots. Vesicle reddish-yellow with some dispersed dark spots; aculeus reddish at its base and blackish at its extremity. Venter: coxapophysis, sternum, genital operculum and pectines yellowish; sternites yellow with some discrete reddish zones; sternite VII with blackish spots over the carinae. Chelicerae yellowish without any variegated pigmentation; teeth of fingers reddish to blackish. Pedipalps: yellowish with only two small blackish spots at the base of the movable fingers; rows of granules on the edges of the fingers dark to blackish. Legs yellowish, without spots.

*Morphology*. Carapace moderately granular; anterior margin almost straight, with a weak median concavity. All carinae weak; furrows moderate to strong. Median ocular tubercle slightly anterior to the center of carapace; median eyes separated by one ocular diameter. Three pairs of lateral eyes. Sternum between sub-triangular and sub-pentagonal in shape. Mesosoma: tergites with thin, moderately intense granulation.

Median carina moderately developed on all tergites. Tergite VII pentacarinata. Venter: genital operculum consisting of two subtriangular plates. Pectines: pectinal teeth count (24 to 27); basal middle lamellae of each pecten elongated and weakly curved, widening only in proximal third. Sternites smooth, with moderately elongated stigmata; VII with four vestigial carinae and a few thin granules. Metasoma: segments I to III with 10 carinae, moderately crenulate. Segment IV with 8 carinae, moderately crenulate. Segment V with 5 carinae, the dorsal one being only weakly marked. Dorsal carinae on segments I-IV with weak posterior spinoid granules. Intercarinal spaces moderately to weakly granular. Telson with dispersed granules on lateral and ventral surfaces; dorsal surface smooth; aculeus moderately curved and shorter than the vesicle; subaculear tooth absent. Cheliceral dentition characteristic of the family Buthidae; two distinct basal teeth present on the movable finger, the more basal one being slightly reduced (Vachon, 1963); ventral aspect of both fingers and of manus with dense, long setae. Pedipalps: femur pentacarinata; patella with carinae represented by spinoid granules on the internal and dorsal faces; tibia without carinae, all faces weakly granular to smooth. Movable and fixed fingers with 13/12 oblique rows of granules. Trichobothriotaxy; orthobothriotaxy A- $\alpha$  (Vachon, 1974, 1975). Legs: tarsus with numerous very short thin setae ventrally. Patellar spurs present on legs III and IV; pedal spurs present on legs I to IV; all spurs strong.

***Grosphus bistriatus* Kraepelin**

Figs 3-4, 15, 17, 21

*Grosphus bristriatus* Kraepelin, 1900: 14.

*Grosphus bistriatus*; Kraepelin, 1901: 267.

*Grosphus bistriatus* var. *pallicauda* Strand, 1908: 485.

*Grosphus bistriatus*; Fage, 1929: 651.

*Grosphus bistriatus*; Lourenço, 1996: 13.

*Material examined*: Madagascar, Western Region, Ambalanjanakomby, II/2000 (O. Ramilijaona coll.): 1 male. Malainmbandy, VIII/2000 (O. Ramilijaona): 1 female, 1 juvenile (female).

**Coloration.** Basically yellowish. Prosoma: carapace pale yellow with two longitudinal blackish lines behind the median eyes; one small dark spot on the anterior margin and two on the posterior margin fusing with the longitudinal blackish bands on mesosomal tergites; eyes surrounded by black pigment. Mesosoma: yellowish with two longitudinal blackish bands over tergites I-VI, more densely marked in the posterior half of each tergite. Metasoma: all segments yellow with some dark pigmentation on their ventral aspect, most pronounced on segment V; two diffuse spots present on the dorsal face of segment V. Vesicle yellow with dispersed light brownish spots laterally and ventrally; aculeus reddish yellow. Venter: coxapophysis, sternum, genital operculum and pectines yellowish; sternites yellow. Chelicerae yellowish, without any variegated pigmentation; only a few dark spots at the base of reddish fingers. Pedipalps: yellowish throughout without any pigmentation. Legs yellowish with discrete brownish variegated pigmentation.

**Morphology.** Carapace intensely granular; anterior margin almost straight with a weak median concavity. All carinae weak to moderately developed; furrows moderately developed. Median ocular tubercle anterior to the center of carapace; median eyes separated by a little more than one ocular diameter. Three pairs of lateral

**1****2****3****4**

FIGS 1-4

1-2. *Grosphus limbatus*, female, ventral and dorsal aspects (photos Cl. Ratton). 3-4. *Grosphus bistratus*, male, ventral and dorsal aspects (photos Cl. Ratton).

eyes. Sternum between sub-triangular and sub-pentagonal in shape. Mesosoma: tergites with a thin and intense granulation. Median carina moderate on all tergites. Tergite VII pentacarinat. Venter: genital operculum consisting of two subtriangular plates. Pectines: pectinal teeth count (28 in males; 25-26 in females); basal middle lamellae of each pecten not dilated in males, elongated and weakly curved in females, widening in proximal half. Sternites smooth, with moderately elongated stigmata; VII with four vestigial carinae and a few thin granules. Metasoma: segments I and II with 10 carinae, moderately crenulate. Segments III and IV with 8 carinae, moderately crenulate. Segment V with 5 carinae, the dorsal ones being only weakly marked. Dorsal carinae on segments I-IV without any posterior spinoid granules. Intercarinal spaces moderately granular. Telson with very few granules on lateral and ventral surfaces; dorsal surface smooth; aculeus moderately curved and shorter than the vesicle; subaculear tooth absent. Cheliceral dentition characteristic of the family Buthidae (Vachon, 1963); two distinct basal teeth present on the movable finger, the more basal one being slightly reduced; ventral aspect of both fingers and of manus with dense, long setae. Pedipalps: femur pentacarinat; patella with carinae represented by some spinoid granules on the internal face; tibia without carinae, all faces weakly granular to smooth. Movable and fixed fingers with 12/11 oblique rows of granules. Trichobothriotaxy; orthobothriotaxy A- $\alpha$  (Vachon, 1974, 1975). Legs: tarsus with numerous short thin setae ventrally. Patellar spurs present on legs III and IV, pedal spurs present on legs I to IV; all spurs strong.

#### DESCRIPTION OF A NEW SPECIES

##### *Grosphus ankafantsika* sp. n.

Figs 5-8, 10-14, 16, 18-20, 22-25

*Grosphus bistriatus*; Fage, 1929: 651-652 (in part, misidentification)

*Grosphus bistriatus*; Lourenço, 1996: 13 (misidentification)

*Grosphus bistriatus*; Lourenço, 2001: 459 (misidentification)

*Material examined*: Madagascar, Majunga Province, Ankafantsika Reserve, Ampijoroa Forest Station (16°18'S 46°48'E), sand area of *Paquypodium* (G. García Herrero coll.), 27/II, 01/III/2001 (pitfall traps): 1 female (holotype), 11 males (paratypes); "Jardin Botanique A" (G. García Herrero coll.), 24-27/II/2001 (pitfall traps): 6 males, 2 females, 1 female with brood (45 juveniles) (paratypes). Type material deposited in the Muséum d'histoire naturelle, Genève.

*Etymology*: The name of the type locality (Ankafantsika Reserve) is placed in apposition to the generic name.

*Diagnosis*: The morphology of the new species shows that it is close to *Grosphus bistriatus* Kraepelin, but it can be readily distinguished from that species by the following characters: (i) carapace yellowish with an inverted triangular blackish spot; (ii) dark confluent zones on lateral sides of tergites, next to the blackish bands; (iii) spots on legs vestigial or absent; (iv) carapace moderately granular; (v) basal middle lamellae of the female pectines elongated and curved, constantly narrowing from the base to the apex.

*Description*: It is based on female holotype and one male paratype. Measurements in Table I.

*Coloration*. Basically yellowish with some dark zones on the body. Prosoma: carapace yellow with an inverted blackish triangular spot between median and lateral

5



6



7



8



FIGS 5-8

*Grosphus ankarafantsika* sp. n. 5-6. Female holotype. 7-8. Male paratype. Ventral and dorsal aspects (photos Cl. Ratton).

eyes; two dark spots on the posterior margin; eyes surrounded by black pigment. Mesosoma: dark yellow with confluent dark zones and with two longitudinal blackish strips over tergites I-VI running from the two spots on the posterior margin of the carapace. Metasoma: all segments yellowish with some vestigial dark pigmentation on the ventral carinae. Vesicle reddish yellow without spots; aculeus with yellowish base and dark reddish tip. Venter: coxapophysis, sternum, genital operculum and pectines

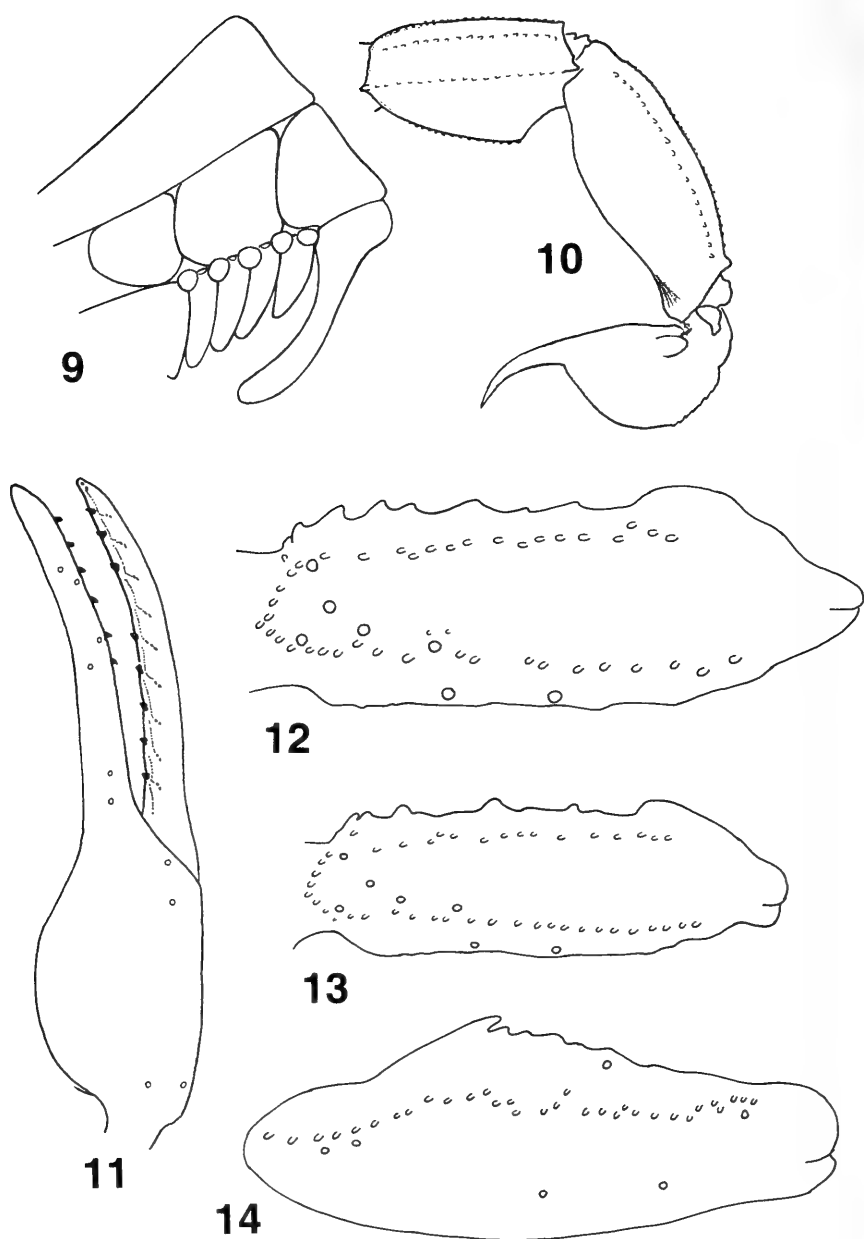


TABLE I. Morphometric values (in mm) of the male paratype and female holotype of *Grosphus ankaraefantsika* sp. n.

|                      | ♂-paratype | ♀-holotype |
|----------------------|------------|------------|
| Total length         | 37.0       | 49.0       |
| Carapace:            |            |            |
| - length             | 4.6        | 6.0        |
| - anterior width     | 3.3        | 4.6        |
| - posterior width    | 4.8        | 7.5        |
| Metasomal segment I: |            |            |
| - length             | 3.3        | 4.4        |
| - width              | 2.8        | 3.9        |
| Metasomal segment V: |            |            |
| - length             | 5.7        | 7.3        |
| - width              | 3.0        | 3.8        |
| - depth              | 2.3        | 3.3        |
| Vesicle:             |            |            |
| - width              | 2.3        | 3.0        |
| - depth              | 1.9        | 2.8        |
| Pedipalp:            |            |            |
| - Femur length       | 3.5        | 5.2        |
| - Femur width        | 1.2        | 1.6        |
| - Patella length     | 5.0        | 6.0        |
| - Patella width      | 1.8        | 2.4        |
| - Tibia length       | 8.4        | 10.2       |
| - Tibia width        | 2.3        | 2.7        |
| - Tibia depth        | 2.2        | 2.6        |
| Movable finger:      |            |            |
| - length             | 4.6        | 6.2        |

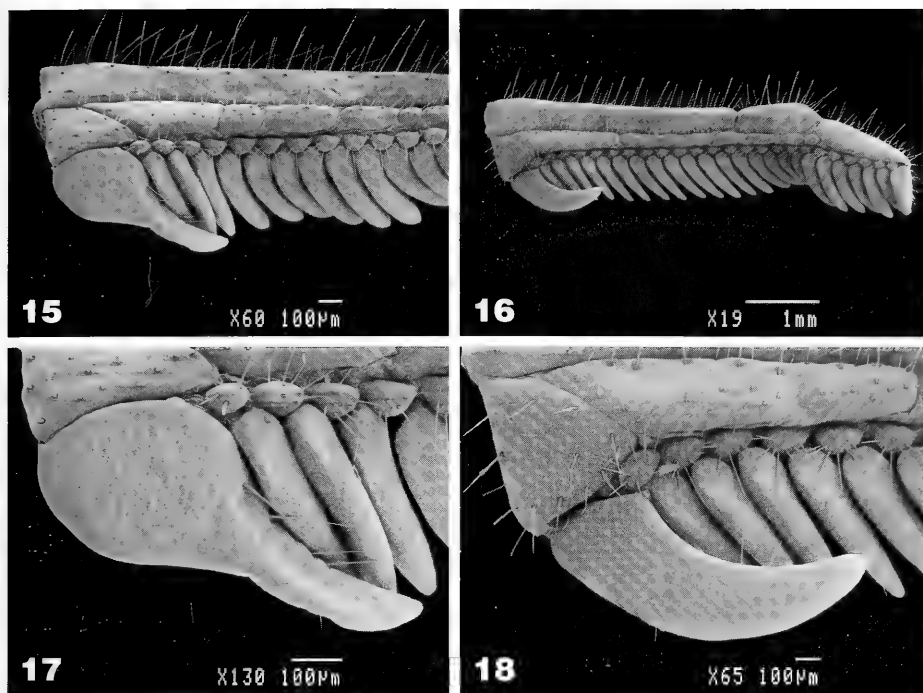
yellowish; sternites reddish yellow. Chelicerae yellowish with dark variegated pigmentation on the anterior third; fingers reddish. Pedipalps: yellowish with vestigial dark zones on femur and patella. Legs yellowish with vestigial brownish zones (absent in some specimens).

Morphology. Carapace moderately granular; anterior margin almost straight, with a weak median concavity. All carinae weak; furrows moderately developed. Median ocular tubercle anterior to the center of carapace; median eyes separated by a little more than one ocular diameter. Three pairs of lateral eyes. Sternum between sub-triangular and sub-pentagonal in shape. Mesosoma: tergites with thin but moderately intense granulation. Median carina moderately developed in all tergites. Tergite VII pentacarinata. Venter: genital operculum consisting of two subtriangular plates. Pectines: pectinal teeth count 24-24 (female holotype; variation: 27 to 31 in males; 24 to 27 in females); basal middle lamellae of each pecten not dilated in males; elongated and curved in females; constantly narrowing from the base to the apex. Sternites smooth, with elongated stigmata; VII with two vestigial carinae. Metasoma: segments I and II with 10 carinae, moderately crenulate. Segments III and IV with 8 carinae, moderately crenulate. Segment V with 5 carinae, the dorsal one being only weakly pronounced. Dorsal carinae on segments I-IV without any posterior spinoid granules. Intercarinal spaces weakly granular. Telson with granules scattered over latero-ventral



FIGS 9-14

9. *Grosphus limbatus*. Detail of basal middle lamellae of the female pecten. 10-14. *Grosphus ankarafantsika* sp. n. 10. Metasomal segments IV-V and telson, lateral aspect (female holotype). 11-14. Trichobothrial pattern. 11. Tibia (female holotype). 12. Femur (female holotype). 13. Femur (male paratype). 14. Patella (male paratype).



FIGS 15-18

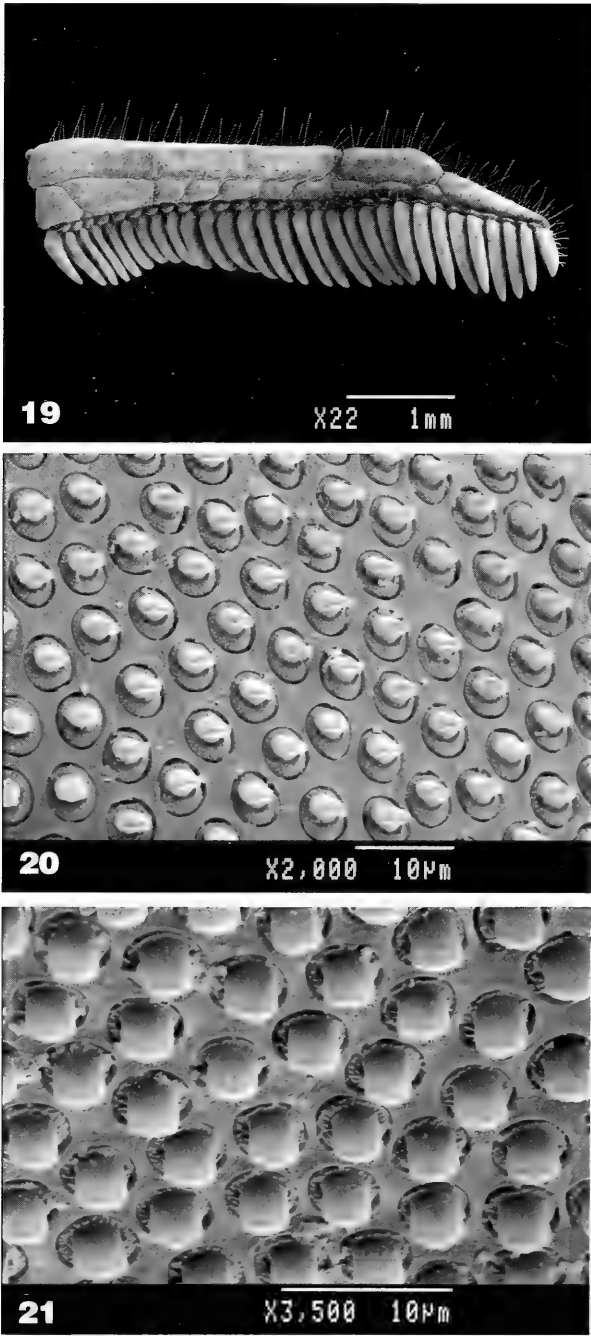
15,17. *Grosphus bistriatus*. 16,18. *Grosphus ankarafantsika* sp. n. 15-16. Left pecten of female. 17-18. Basal middle lamellae, in detail.

and ventral surfaces; its dorsal surface smooth; aculeus moderately curved and shorter than the vesicle; subaculear tooth absent. Cheliceral dentition characteristic of the family Buthidae (Vachon, 1963); two distinct basal teeth present on the movable finger, the more basal of them being slightly reduced; ventral aspect of both fingers and of manus with dense, long setae. Pedipalps: femur pentacarinat; patella with a dorso-internal carina and with several spinoid granules on the internal face; tibia smooth, without carinae, all faces weakly granular to smooth. Movable and fixed fingers with 11/10 (females) and 12/11 (males) oblique rows of granules. Trichobothriotaxy; orthobothriotaxy A- $\alpha$  (Vachon, 1974, 1975). Legs: tarsus with numerous short thin setae ventrally. Patellar spurs present on legs III and IV; pedal spurs present on legs I to IV; all spurs strong.

*Remarks:* The new species was collected in the Reserve together with *Grosphus madagascariensis* (Gervais) and *Grosphus garciai* Lourenço. These specimens are also deposited in the Muséum d'histoire naturelle, Genève.

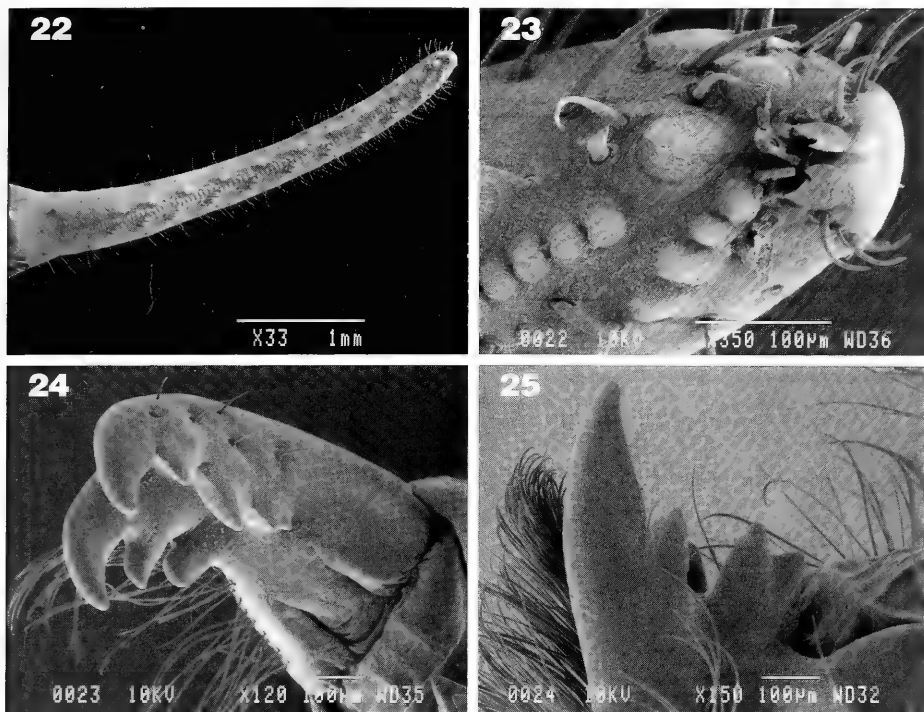
#### DISCUSSION

*Buthus limbatus* (= *Grosphus limbatus*) was described by Pocock (1889) on the basis of four specimens (one male and three females) collected by Rev. R. Baron in



FIGS 19-21

Pectines. 19. Male pecten of *Grosphus ankarafantsika* sp. n., global view. 20-21. Microstructure of peg sensilla on teeth. 20. *Grosphus ankarafantsika* sp. n. 21. *Grosphus bistriatus*.



FIGS 22-25

*Grosphus ankarafantsika* sp. n. (male paratype). 22. Movable finger of tibia pedipalp. 23. Detail of distal extremity of the same. 24. Movable finger of chelicera. 25. Fixed finger of chelicera.

Madagascar, but without giving any precise locality. The description by Pocock was very precise, and Fage (1929) was subsequently able to identify further material of this species (probably without examination of Pocock's type material) and to demonstrate its presence on the Central Plateau of Madagascar.

The morphology of the basal middle lamellae of the female pectines is a diagnostic character for *Grosphus* species. The description given by Pocock (1889) for this character is clear and accurate: "in the female the basal tooth is very much enlarged being about twice as long as the rest and flask-shaped, i. e. dilated proximally and abruptly narrowed and slender distally." This character was precisely illustrated by Pocock (1889: Fig. 7a), and also by Fage (1929: Fig. 6); its morphology was later confirmed by Lourenço (1996: Fig. 8).

The precise identity of *Grosphus bistriatus* appears unclear. This species was described by Kraepelin (1900), on the basis of two specimens (syntypes) collected near Tulear in the south of Madagascar. Fage (1929), based his redescription on several specimens from different localities, including some from the "Massif d'Ambre" and "Maevatanana" in the northern range of the island. One of the syntypes, preserved in alcohol and deposited in the "Muséum national d'Histoire naturelle" in Paris, was

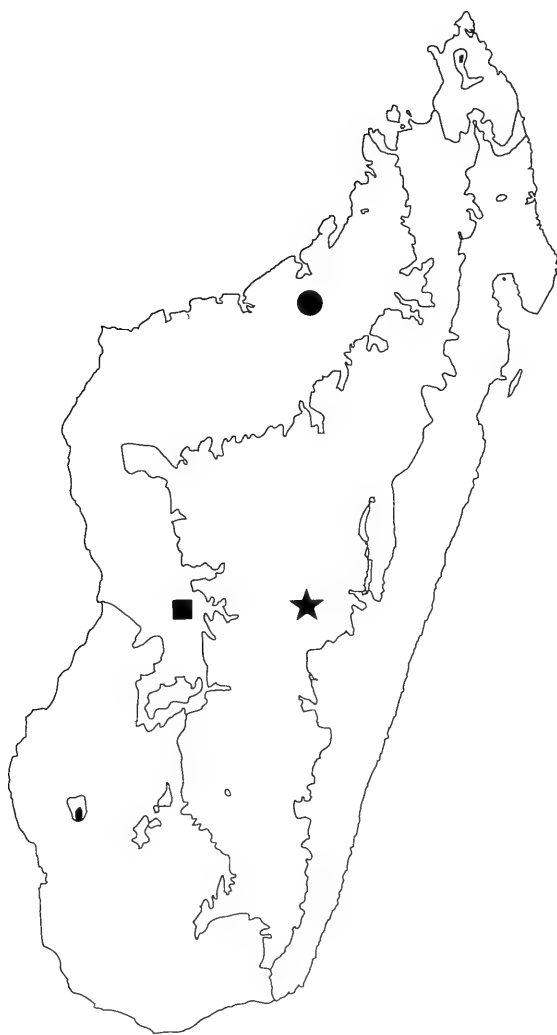


FIG. 26

Map showing the type locality of *Grosphus ankarafantsika* sp. n. (black circle) and the sites from where the new material of *G. limbatus* (black star) and *G. bistriatus* (black square) has been collected.

probably already bleached when Fage examined it. Therefore, the colouration described by Fage was probably based on other non-type specimens. The morphology of the basal middle lamellae of the female pectines, illustrated by Fage (1929: Fig. 5), differs from that of the bleached syntype. In his diagnosis of *G. bistriatus*, Lourenço (1996) accepted the redescription by Fage (1929) and reported the presence of this species in the "Réserve naturelle intégrale n° 7 de l'Ankarafantsika); a misidentification subsequently confirmed by Lourenço (2001).

An examination of newly collected material of *G. bistriatus* from close to the type locality (region of Tulear), provide clarification on coloration and patterns of pigmentation of this species. In addition, the precise morphology of the basal middle lamellae of female pectines is described in here. Moreover, the population present in the Ankarafantsika Reserve is described as a new species, i. e. *G. ankarafantsika* sp. n. *Grosphus limbatus*, *G. bistriatus*, *G. intertidalis* Lourenço and *Grosphus ankarafantsika* sp. n. represent a species group which is isolated from the other species of the genus.

KEY TO THE SPECIES OF THE GENUS *GROSPHUS*

- 1 Pectines with a maximum of 21 teeth . . . . . 2
- (1) Pectines with more than 22 teeth . . . . . 4
- 2 Colouration yellowish to reddish yellow, with variegated brownish pigmentation; body length about 30 mm . . . . . *G. garciai*
- (2) Colouration dark, from reddish brown to dark brown; body length about 50 mm . . . . . 3
- 3 Colouration reddish brown to dark brown, without light spots; metasomal segment I longer than wide; basal middle lamellae of female pectines oval in shape . . . . . *G. madagascariensis*
- (3) Colouration reddish brown with lighter spots; metasomal segment I wider than long; basal middle lamellae of female pectines subquadrangular in shape . . . . . *G. hirtus*
- 4 Colouration blackish throughout; pectines with 30 to 40 teeth; body length more than 90 mm . . . . . *G. grandidieri*
- (4) Colouration reddish brown to yellowish, never blackish; body length less than 90 mm . . . . . 5
- 5 Mesosoma with homogenous colouration, reddish brown or yellowish . . . . 6
- (5) Mesosoma with a blackish median longitudinal band, or with two blackish lateral longitudinal bands . . . . . 9
- 6 Total length more than 70 mm; mesosoma reddish brown; basal middle lamellae of female pectines two times longer than wide at their base . . . . . *G. flavopiceus*
- (6) Total length less than 60 mm; mesosoma yellowish; basal middle lamellae of female pectines three times longer than wide at the base . . . . . 7
- 7 Metasomal segment V and telson pale yellowish . . . . . *G. intertidalis*
- (7) Metasomal segment V and telson with blackish spots or blackish throughout . . . . . 8
- 8 Metasomal segment V and telson with blackish spots . . . . . *G. annulatus*
- (8) Metasomal segment V and telson blackish . . . . . *G. feti*
- 9 Mesosoma with a wide blackish median longitudinal band; basal middle lamellae of female pectines three times longer than wide at their base and covering the 4 proximal teeth . . . . . *G. limbatus*
- (9) Mesosoma with two narrow blackish lateral longitudinal bands . . . . . 10

- 10 Carapace without a blackish triangular spot; basal middle lamellae of female pectines weakly curved, widening in proximal half and covering the two proximal teeth . . . . . *G. bistriatus*
- (10) Carapace with a blackish triangular spot; basal middle lamellae of the female pectines curved and constantly narrowing from the base to apex covering the four proximal teeth . . . . . *G. ankarakantsika* sp. n.

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## Catalogue des types de Lamiinae (Coleoptera, Cerambycidae) conservés au Muséum d'histoire naturelle, Genève

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**A catalogue of the types of Lamiinae (Coleoptera, Cerambycidae) housed in the Muséum d'histoire naturelle, Geneva.** - A list is provided of 218 holotypes, the syntypes of 15 species and subspecies, and paratypes of 129 species and subspecies of the Lamiinae presently housed in the Muséum d'histoire naturelle, Geneva. Most of the names were published by S. Breuning. As the taxonomic treatment of the Lamiinae was often inadequate it was necessary to check the original descriptions for all names listed. The authenticity of several "types" is found doubtful. They are indicated by "?HP" or "?PT". Unpublished information from labels is given in square brackets. Illegible handwritten text is indicated by the sign □. When a description was published twice, a reference to the second description is given in parentheses. Separate lists are given for type material of varieties published before 1961, and for unavailable names published with designation of type material.

**Key-words:** Coleoptera – Cerambycidae – Lamiinae – type material.

### INTRODUCTION

Le Muséum d'histoire naturelle de Genève (MHNG) possède une collection de Lamiinae qui compte quelques 5000 espèces. Elle consiste en une collection historique de A. Melly à laquelle se sont ajoutés les collections H.-A. Junot, R. Mussard, W. Siess, les récoltes faites par les entomologistes du Muséum ainsi que des lots importants cédés par S. Breuning.

Cette collection contient de nombreux spécimens étiquetés holotype, paratype ou syntype. Pour la plupart, il s'agit de taxa décrits par Breuning qui, au cours de soixante ans consacrés à l'entomologie, a étudié la plupart des collections de *Lamiinae* des principaux musées européens et publié environ 630 articles dont plus de 600 sont consacrés aux *Lamiinae*. Les spécimens types des espèces qu'il a décrites se retrouvent dispersés dans ces différentes institutions et il paraissait utile d'établir une liste des noms de ces taxa, conformément à la recommandation 72F 4 du Code International de Nomenclature Zoologique (4<sup>e</sup> éd., 1999), pour faciliter le travail des réviseurs potentiels qui, en plus des difficultés découlant des anciennes définitions sommaires des taxa, se trouvent souvent dans l'impossibilité de localiser le matériel typique indispensable à toute étude.

## MATÉRIEL ET MÉTHODES

Les sources principales ont été le Catalogue des Lamiaires du Monde (Breuning, 1958-1969), la bibliographie de Breuning (Breuning, 1984), les Zoological Records et les descriptions originales des différents auteurs.

Les noms des taxa sont écrits suivant l'orthographe (éventuellement complétée par l'orthographe subséquente reconnue), la combinaison et le statut originaux. Ils sont répertoriés alphabétiquement, sans mention de sous-genre ni de tribu. La localité type est donnée pour chaque nom comme publiée. La page indiquée correspond à la première page sur laquelle le nom a été introduit. La date relevée est celle de la parution effective, suivie entre parenthèses de la date imprimée sur la publication, quand elles sont différentes. En cas d'homonymie, les références relevées concernent l'espèce en collection. Les références bibliographiques sont apportées in extenso en fin de catalogue. Quand une même description «originale» est publiée deux fois, la deuxième publication est notée entre parenthèses. Breuning ayant diversement signé ses publications: Stephan von Breuning, S. Breuning ou Etienne de Breuning, dans un souci d'homogénéité, l'orthographe «Breuning S.» a été choisie, suivie de (E.) quand la signature est francisée, la particule n'est pas mentionnée. Certaines informations d'étiquettes manuscrites illisibles, sont notées ill.; quand seules certaines lettres sont illisibles, elles sont remplacées par □. Le terme «type» est transcrit holotype quand la description originale le précise ou quand elle ne s'appuie que sur un seul spécimen, syntype quand elle s'appuie sur plusieurs spécimens ou quand les spécimens sont notés cotypes (CT). Contrairement à ce qui a été écrit (Breuning, 1974), les types de la collection Chassot n'ont pas été déposés au MHNG (communication personnelle, Besuchet, 1999).

Certaines incohérences ayant été décelées, il paraissait nécessaire de vérifier l'authenticité «en tant que type» de ces spécimens et la disponibilité de leur nom. La validité de ces noms n'a cependant pas été contrôlée.

- *Holotypes, syntypes.* L'authenticité des spécimens en tant que porte-nom a été établie par le contrôle avec les descriptions originales. Il nous a semblé préférable de donner la priorité aux informations de ces dernières qui font référence, leur accord avec les informations des étiquettes présumant de l'authenticité du spécimen. Sont considérés comme authentiques les «types» dont les données des étiquettes correspondent à celles de la description originale, ils sont notés **HT** ou **ST**. Quand les données des étiquettes complètent l'information publiée, elles sont apportées entre crochets. Quand les données des étiquettes sont en contradiction avec celles de la description originale ou quand le lieu de dépôt mentionné n'est pas le MHNG, les «types» sont considérés comme douteux, ils sont notés **?HT** ou **?ST**, les informations contradictoires sont alors notées entre crochets.

- *Paratypes.* Leur authenticité est difficilement vérifiable. Ils ne sont pas toujours mentionnés dans les descriptions originales et quand ils le sont, leur nombre n'est que rarement indiqué, leur lieu de conservation a pu changer étant souvent utilisés pour des échanges par les collectionneurs privés. Conventionnellement, sont présumés authentiques les «paratypes» dont les données des étiquettes correspondent à celles de la description originale **et** dont il est fait mention dans celle-ci. Ils sont notés **PT**. Sont

considérés comme douteux les «paratypes» qui ne sont pas mentionnés dans la description, ceux dont les informations des étiquettes et de la description sont contradictoires ou ceux qui se trouvent en «surnombre», ils sont notés ?PT. N'ont pas été mentionnés ceux portant une date de récolte postérieure à celle de la description!

La disponibilité des noms a été établie selon les dispositions du Code International de Nomenclature Zoologique, 4<sup>e</sup> éd., 1999 (ICZN).

- Les noms du niveau espèce et sous-espèce publiés comme tels sont répertoriés dans la **liste 1**. Celle-ci compte 218 holotypes, 17 syntypes de 15 espèces et 203 paratypes de 129 espèces pouvant être considérés comme authentiques. Il s'agit principalement de représentants de la tribu des Saperdini (*Oberea*: 50 holotypes, 1 syntype et 36 paratypes de 25 espèces; *Phytoecia*: 36 holotypes, 2 syntypes de 2 espèces et 14 paratypes de 9 espèces).

- Les noms publiés en tant que «variété» avant 1961, sont disponibles (ICZN: art. 45.6.4) et répertoriés dans la **liste 2** (1 holotype et 2 syntypes d'une espèce).

- Les noms infra-subspécifiques autres que ceux de «variété» ou «forme» publiés avant 1961, ne sont pas disponibles, sauf s'ils ont été utilisés au niveau subspécifique avant 1985 (ICZN: art. 45.6.4.1.) (ce que nous n'avons pas vérifié dans ce travail). Tous ces noms sont donc répertoriés dans la **liste 3**. Les noms du niveau infra-subspécifique publiés après 1960, bien que n'étant pas disponibles (ICZN: art. 45.6.2. et 45.6.3) sont également répertoriés dans la **liste 3**.

- Les noms de collection n'ont pas été retenus pour éviter une interprétation erronée de leur disponibilité, mais pourraient être communiqués sur demande, sous forme d'une liste. Cette liste répertorie les noms du niveau espèce, sous-espèce ou infra-subspécifique pour lesquels aucune référence n'a été trouvée dans la littérature. Il pourrait s'agir d'espèces non décrites, d'espèces renommées ou corrigées par Breuning ou encore de noms ayant échappé à notre vigilance. Elle répertorie également des noms pour lesquels des notes inédites de Breuning ont été retrouvées.

## LISTE 1: NOMS DU NIVEAU ESPÈCE ET SOUS-ESPÈCE

*Abryna coenosa mindanaonis* Breuning, 1980e: 169.

2 ?PT: [Insel Mindanao].

*Acalolepta australis orientalis* Breuning, 1982: 18.

PT: Papouasie, archipel de la Louisiade, île Sud-Est, IV.1898, Meek coll.

*Acalolepta australis saintaignani* Breuning, 1970a: 377 (Breuning, 1982: 18).

3 PT: St. Aignan, 8.IX.1897 [Meek coll.]; 2 ?PT: [St Aignan, VIII-XI.97, Meek].

*Acalolepta brunnescens* Breuning, 1980e: 175.

3 ?PT: [Insel Mindanao].

*Acalolepta densefuscomarmorata* Breuning, 1982: 19.

?PT: [Woodlark, Meek, 95].

*Acalolepta densemarmorata* Breuning, 1970b: 475.

PT: Neu Hannover, II-III.97, Webster.

- Acalolepta holobrunnea* Breuning, 1980e: 174.  
3 PT: Insel Mindanao.
- Acalolepta lumawigi* Breuning, 1980e: 175.  
?PT: [Philippines, Insel Mindanao].
- Acalolepta meeki* Breuning, 1982: 18.  
PT: Papouasie, archipel de la Louisiade, Ile Sud-Est, IV.1898, Meek coll.
- Acalolepta paravariolaris* Breuning, 1980e: 175.  
?PT: [Insel Mindanao].
- Acalolepta saintaignani* Breuning, 1982: 18.  
2 PT: Papouasie, archipel de la Louisiade, île Saint-Aignan, VIII-XI.1897, Meek coll.
- Acalolepta woodlarkiensis* Breuning, 1970b: 476.  
?PT: [Woodlark, Meek, 95].
- Acridoschema mbargai* Breuning, 1972a: 282.  
PT: Cameroun, M'Balmayo, II.72, leg. M'Barga.
- Agapanthia fallax* Holzschuh, 1974 (1973): 95.  
PT: Anatolie, prov. Mus, Buglangeçidi, 1600m, 11-17.VI.1973, Holzschuh.
- Agelasta albesignata* Breuning, 1980e: 158.  
?PT: [Philippines, Mindanao, leg. Lumawig].
- Agelasta albostictica* Breuning, 1980e: 158.  
4 ?PT: [Insel Mindanao].
- Agelasta mediofasciatipennis* Breuning, 1974g: 78.  
?PT: [Philippines, Luzon, Prov. Benguet S.P., Baguio].
- Amblymora obiensis* Breuning, 1956d: 685.  
HT: Ile Obi, ex coll. Preiss, coll. Lepesme [Moluques].
- Anauxesis rufipennis* Breuning, 1976b: 738.  
HT: Kenya, Shimba Hills, près Kwale, 29.XI.1974, leg. V. Mahnert et J. Perret [près Madabara, Pumping station, tamisage].
- Anauxesis rufoscapa* Breuning, 1950b: 7.  
HT: Transvaal, Shilouvane, leg. H. Junod.
- Ancylonotopsis pictoides* Breuning, 1974d: 775.  
?PT: [Ht Zaïre, Kingansani].
- Anexodus sarawakensis* Sudre, 1997: 253.  
HT: ♂, E. Malaisie, Sarawak, confl. Sun Oyan, et Mujong river, E. Kapit, 500m, 18.V.1994, Löbl et Burckhardt; 2 PT ♂ et ♀: idem.
- Annamanum fuscomaculatum* Breuning, 1979b: 99.  
?PT: [Yunnan, Peyentsin]; 2 ?PT: [Yunnan, Djoukoula].

*Apriona yayeyamai* Breuning, 1976b: 739.

HT: ♂, Japon, Ile Ishigakishima, Yayayama, leg. Ohbayashi.

*Arachneomatidia beatricea* Sudre, 2000: 83.

HT: New Caledonia, Mt Khogi, prim. for., 400-500m, litter, 18-19.X.1998, Löbl; PT: idem.

*Astathes bimaculatoides* Breuning, 1971a: 3.

?PT: [Laos, Paksé, Coll. Rondon]; 2 ?PT: [Laos, Paksé, 31.V.67]; 2 ?PT: [idem mais 15.VI.67].

*Australiorondonia australica* Breuning, 1982: 25.

3 PT: Australia.

*Bacchisa nigricornis* Breuning, 1969a: 37.

HT: ♂, Laos, Pa-Hia, 19.IV.50, leg. J. Romieux.

*Batrachorhina rodriguezi* Breuning, 1948: 22.

PT: Rodrigues, 1934, Dr Madge.

*Blapsilon baloghi* Breuning, 1978a: 25.

2 PT: New Caledonia, Mont Rembai, 19-21.I.1977, leg. Dr J. Balogh.

*Blapsilon kaszabi* Breuning, 1978a: 26.

PT: New Caledonia, Mont Rembai, 19-21.I.1977, leg. Dr J. Balogh.

*Blepisanis disconotaticollis* Breuning, 1950c: 21.

2 PT: Kongo Belg. [Beni].

*Blepisanis flavovittata* Breuning, 1950c: 23.

?PT: [Congo, Elisabethville].

*Blepisanis guineensis* Kolbe, 1893: 78.

ST: Togo, Bismarckburg [1.VI-15.VII.91, R. Büttner S.].

*Blepisanis incallosa* Breuning, 1950d: 273.

?PT: [Angola, Bailundo].

*Blepisanis lineata* Aurivillius, 1913: 35.

ST: Angola, Bailundo.

*Blepisanis orientis* Aurivillius, 1910: 151.

2 ST: Kilimandjaro, Kibonoto, Kulturzone [S. Jöstedt, 1905-6, 1300m].

*Blepisanis subcallosa* Breuning, 1950c: 22.

2 ?PT: [Angola, Bailundo].

*Blepisanis uniformis* Breuning, 1950c: 19.

2 ?PT: [Angola, Bailundo].

*Brachychilus lituratus* Blanchard, 1851: 500.

ST: Chili, Santiago, Coquimbo, Illapel, Arquero, etc. [Chili, Santiago, Gay, 1849].

*Brachychilus scutellaris* Blanchard, 1851: 500.

ST: Chili, Santiago, Santa Rosa, etc. [Chili, Gay, 1849].

*Brachyolene unicolor* Breuning, 1974b: 372.

HT: Côte d'Ivoire, Sassandra, XII.1949, leg. R. Mussard.

*Cacia grossepunctata* Breuning, 1980e: 160.

?PT: [Insel Mindanao].

*Celosterna perakensis* Breuning, 1976b: 739.

HT: Malaisie, Perak, Taiping, 14.III.1972, leg. K.C. Liew.

*Cereopsius sexmaculatus immaculithorax* Breuning, 1974f: 238.

2 PT: Borneo, Maloewi [Coll. Besnard].

*Cereopsius spilotoides* Breuning, 1974a: 74.

HT: Philippines, Ile Luzon, Manila, Zambo, IX.1928, W. Parsons; PT: idem.

*Ceroplesis aestuans dakarensis* Fiedler, 1938: 591.

PT: Dakar [Afr. Occ., Dakar / det. H. Fiedler, 1937]; PT: Dakar [Sénégal, Dakar, Fr. West Africa / det. H. Fiedler, 1937].

*Ceroplesis aestuans ubangiensis* Fiedler, 1938: 592.

PT: Uganda [Brit. Uganda, Graner / det. H. Fiedler, 1937]; PT: Fort Crampel [det. H. Fiedler, 1937].

*Ceroplesis aulica jokoana* Fiedler, 1938: 603.

?PT: [Sd. Kamerun, Heyne, Berlin-Wilm. / det. H. Fiedler, 1937]; ?PT: [Tykargeb., ill., VIII.1912 / det. H. Fiedler, 1937].

*Ceroplesis calabarica lemekensis* Fiedler, 1938: 597.

PT: Nyanza Province, Salt Marsh [B.E.A].

*Ceroplesis calabarica ubangica* Fiedler, 1938: 594.

PT: Fort Crampel [Long, F.2 / det. H. Fiedler, 1937]; PT: Lado [Brit. Afr., A Heyne, Berlin-Wilm. / det. H. Fiedler, 1937]; ?PT: [Bamenida, 7.VII.05, Sch. / det. H. Fiedler, 1937]; ?PT: [Congo français / det. H. Fiedler, 1937].

*Ceroplesis capensis bamumica* Fiedler, 1938: 577.

PT: Bamum [Kamerun, Kuti, 1040m / det. H. Fiedler, 1937].

*Ceroplesis capensis camerunensis* Fiedler, 1938: 577.

PT: Fort Crampel [Congo français / det. H. Fiedler, 1937].

*Ceroplesis capensis usambarica* Fiedler, 1938: 575.

PT: Tanga [det. H. Fiedler, 1937].

*Ceroplesis hauseri conjuncta* Hintz, 1920 (1918): 172.

HT: Deutsch-Ostafrika, Njassasee.

*Ceroplesis hottentotta natalensis* Fiedler, 1938: 612.

2 PT: Natal [det. H. Fiedler, 1937].

*Ceroplesis orientalis natalensis* Fiedler, 1938: 605.

PT: Natal [det. H. Fiedler, 1937].

*Ceroplesis semitrabeata nguruana* Fiedler, 1938: 608.

?PT: [Africa occid., Coll. Nonfried / det. H. Fiedler, 1937].

*Ceylanoparmena loebli* Breuning, 1971b: 306.

HT: Ceylan Central, Hatton, montagne boisée à l'est de la ville, 9.II.1970, 1400m, tamisage en forêt [Mussard, Besuchet et Löbl].

*Chariesthes nigroapicipennis* Breuning, 1977a: 266.

PT: Doum, Akono [12.VII.70 / Test cacao].

*Cleptometopus assamanus* Breuning, 1967a: 32.

HT: Inde, Manipur, 30.VIII.1960, leg. Schmid [Assam-Manipur, Langdang, 5300ft]; PT: idem [Assam-Manipur, Phaiphengmu, 5000ft].

*Cleptometopus grossepunctatus* Breuning, 1967a: 32.

HT: Assam, leg. Schmid [Kameng].

*Cleptometopus parolivaceus* Breuning, 1972c (1971): 416.

HT: Sikkim, Chumtang, 17.VII.1959, 1550m [Himalaya, Schmid].

*Cleptometopus scutellatus* Hüdepohl, 1996: 3.

HT: ♂, Sumatra, Jambi, W Mt Tujuh Lake, 1400m, 14.XI.1989, Agasti, Löbl, Burckhardt.

*Cleptometopus sikkimensis* Breuning, 1972c (1971): 416.

HT: Sikkim, Manu, 10.V.1959, 1500m [Himalaya, Schmid].

*Cleptometopus subteraeus* Breuning, 1967a: 33.

HT: Western Bengale, 15.XII.1959, leg. Schmid [Git Dabbling, 4900-5100ft].

*Conizonia chehirense* Breuning, 1943: 103.

HT: Anatolie, Ak-Chéir [1900]; ?PT: [Anatolien, Ak-Chehir, 1900, Korb].

*Coptops illicita rosacea* Breuning, 1980e: 157.

2 ?PT: [Insel Mindanao].

*Cristoberea assamensis* Breuning, 1954a: 531.

2 ?PT: [Assam, Shillang].

*Cristorhodopina mussardi* Breuning, 1966c: 15.

HT: Assam, 2.VI.1961, leg. Schmid, coll. Mussard [Kameng, Ithum La 2400m].

*Cylindrepomus grammicus hecate* Dillon et Dillon, 1948: 274.

PT: I. Salomon, Bougainville.

*Daphisia formosana* Schwarzer, 1925: 153.

ST: Formosa, Taihorin, 1911, H. Sauter.

*Dasyllinda javanica* Vuillet, 1912: 20.

ST: Java, Gounod Gedeh, Ledru 1898, coll. Oberthür.

*Declivocondyloides loebli* Sudre, 2000: 82.

HT: New Caledonia, Col des Roussettes, litter in ravine, 12.IX.1998, I. Löbl;  
PT: idem; PT: New Caledonia, La Trappe above St Louis, wood and leaf litter, 22.X.1998, I. Löbl.

***Diadelia betshi*** Breuning, 1975: 260.

PT: Madagascar Centre, Andringitra Est, Ambalamarovandana, 1500-1600m, FDHMA, 15-25.I.1971 [15.I.1971].

***Dolichoprosopus philippinensis*** Breuning, 1980e: 171.

?PT: [Ile Mindanao, coll. Lumawig].

***Dorcadion blandulus*** Holzschuh, 1977: 131.

PT: Anatolien, prov. Bingöl, östlich des Kuruca geçidi, 1700m, 29.IV.1975, leg. C. Holzschuh et F. Ressler.

***Dorcadion brauni*** Breuning, 1979a: 92.

6 PT: Anatolia occ., Tavas-ovasi ca. 1000m, 26.III.1978, Heinz leg., coll. Heinz;  
4 PT: Anatolie occ., Tavas, Heinz, 1000m, III.1978; 2 PT: Anatolie, Tavas, 1000m, III.78.

***Dorcadion calabricum*** Breuning, 1942: 127.

?PT: [Calabrien, Antonimina, leg. Paganetti].

***Dorcadion czipkai*** Breuning, 1973c: 54.

3 PT: Iran, Azarbaijan, Savelan, 2600m, 29.VII.1972, leg. W. Heinz.

***Dorcadion divisum subdivisum*** Breuning, 1955b: 263.

PT: Anatolien, Ankara, V.1937, leg. Dr N. Vasvary.

***Dorcadion laevipunctatum*** Breuning, 1944: 14.

?PT: [Maced., Ali Botus Exp., Maran et Taborsky lgt.].

***Dorcadion pedestre kaszabi*** Breuning, 1956a: 404.

?PT: Hongrie centrale, Dömsöd, Apajpuszta, V.1953, Kaszab [1952, szikes legelo / egyelve IV.29 / leg. I. Kovacs].

***Dorcadion pseudinfernale*** Breuning, 1943: 94.

?PT: [Mts Amanus].

***Driopea schmidi*** Breuning, 1972c (1971): 418.

HT: Himalaya, Kumaon, Pauri Garhwal, Tarsali, 6.V.1958, 1900-2100m [F. Schmid].

***Eczemotes saintaignani*** Breuning, 1982: 16.

PT: Papouasie, archipel de la Louisiade, île Saint-Aignan, Meek coll., VIII-XI.1897; ?PT: [St Aignan, VIII to XI.97, Meek].

***Elongatohomelix mortoni*** Breuning, 1967a: 29.

HT: ♂, Sumatra, Baros, ex coll. W. Morton.

***Enicodes kaszabi*** Breuning, 1978a: 23.

PT: New-Caledonie, I. Lifou, Bjengen, 21.II.1977, leg. Dr J. Balogh [22.II.1977]; ?PT: [New-Caledonie, I. Lifou, Ouaméne, 22.II.1977, leg. Dr J. Balogh].

***Entelopes fuscotarsalis*** Breuning, 1954a: 480.

?PT: [Bornéo, Matang RD., 5.II.1915]; ?PT: [idem, mais 20.I.16].



*Entelopes griseipennis* Breuning, 1954a: 479.

2 ?PT: [Bornéo occi, Pontianak].

*Entelopes jonoptera sumatrana* Breuning, 1950b: 15.

2 ?PT: [Sumatra].

*Entelopes subsimilis* Breuning, 1968a: 37.

?PT: [B. Van Heua, 30.IV.65].

*Epaphra minor* Heller, 1934: 283.

ST: Luzon, Prov. Laguna, prope Paete, F. C. Hadden leg., ex coll. Dr Reinh. Meyer, Darmstadt [Pangil, Laguna, P.I.].

*Epectasis hiekei* Breuning, 1974e: 157.

PT: Mexico, Cerro de Plumas.

*Epepeotes spinosoides* Breuning, 1980e: 170.

?HT: Ile Mindanao, coll. Lumawig, MNHN [ill., Wallace].

*Eryssamena besucheti* Breuning, 1972c (1971): 417.

HT: Assam, Kameng, Talung Dzong, 12.V.1961, 2100m [Himalaya, F. Schmid].

*Eryssamena schmidi* Breuning, 1972c (1971): 417.

HT: Himalaya, Kumaon, Pauri Garhwal, Pana, 10.VIII.1958, 2500m [F. Schmid].

*Essisus vivesi* Breuning, 1978c: 135.

?PT: [Australie, Brookfield, J. Sedlacek leg., XII.76].

*Eunidia albosignata* Breuning, 1972a: 281.

?PT: [Zaïre, Mambasa, Ituri].

*Eunidia boafai* Breuning, 1978d: 94.

?PT: [Ghana, Tafo, IX-X.1967, Boafai].

*Eunidia flavoapicata tchadensis* Lepesme & Breuning, 1955: 854.

2 PT: Air, Oued Eir, 14.VIII.1949.

*Eunidia fulvescens* Breuning, 1976b: 737.

HT: Kenya, Neu-Moschi, 800m, IV.1912; 2 PT: idem.

*Eunidia nigroapicaloides* Breuning, 1976a: 207.

2 ?PT: [Chota-Nagpore, Nowatoli, V-VI.1896, R.P. Cardon].

*Eunidia pseudosenilis* Breuning, 1970c (1971): 664.

?PT: [Botswana, Serowe, Swaneng Hill, 20.XI.79, U.V., Forchhammer leg., n° 5123].

*Eunidia vagevittipennis* Breuning, 1981b: 56.

?PT: [ill., Iringa D.O.A., coll. Plasoo].

*Eunidia varicolor* Breuning, 1971c: 381.

PT: Ghana, Kumasi.

*Exocentrus assamensis* Breuning, 1972c (1971): 419.

HT: Assam, Kameng, Nyukmadong, 2.VIII.1961, 2000-2400m [Himalaya, F. Schmid].

***Exocentrus celebicus*** Breuning, 1956c: 249.

?HT: Célèbes, Kandelari, IV.1874, leg. O. Beccari, MCSN [Célèbes].

***Exocentrus fuscipes*** Breuning, 1981a: 51.

PT: Kenya, Arusha, XI.1961, P.P. De Moor.

***Exocentrus holonigra*** Breuning, 1972c (1971): 419.

HT: Assam, But, 23.VI.1961, 1750m [Himalaya, F. Schmid].

***Exocentrus laosicus*** Breuning, 1963b: 47.

?PT: [Laos, Wong Tevada, Vientiane, 9.X.62, Coll. Rondon]; ?PT: [id. mais 16.X.62].

***Exocentrus misellomimus*** Breuning, 1963b: 48.

?PT: [Laos, Wong Tevada, Vientiane, 18.X.62, Coll. Rondon / M]; ?PT: [id. mais 28.X.62].

***Exocentrus paravariiegatus*** Breuning, 1981a: 51.

?PT: [Tvl, Rustenburg, 1-2.XII.1957, D.W. Rorke].

***Exocentrus parvus*** Holzschuh, 1984: 157.

PT: Népal, Arun-Valley, Dhankuta, Khantbari-Arunthan, 1100-1300m, 29.V.1938, leg. Holzschuh.

***Exocentrus ravillus*** Holzschuh, 1984: 158.

PT: E. Népal, Arun-Valley, Dhankuta, Lamobagar, 1400m, 8-14.VI.1983, C. Holzschuh.

***Exocentrus rondoni*** Breuning, 1963b: 47.

?PT: [Laos, Phon Tion, 10.VI.63, Coll. J.A. Rondon]; ?PT: [id. mais 22.VI.63].

***Exocentrus unialbovittatus*** Breuning, 1969a: 36.

HT: Congo, Haut-Katanga, Panda, IV.1929, leg. J. Romieux.

***Exocentrus vitticollis*** Breuning, 1974c: 418.

PT: Ethiopie, Prov. Kaffa, Mui, 700m, 10.IV.1972, leg. R.O.S. Clarke [ref. 0550 N / 3545 E].

***Falsepilysta rosselli*** Breuning, 1982: 10.

2 ?PT: [Rossel Is., I-III.98, Meek].

***Frea mussardi*** Breuning, 1969a: 36.

HT, PT (allotype): ♂, Côte-d'Ivoire, Adiopé, VII.1948, leg. Mussard. (L'allotype manque).

***Frea taverniersi*** Breuning, 1973a: 96. (orthographié *tavernieri* dans la collection.)

?PT: [Zaïre, Kisangani].

***Glenea assamana*** Breuning, 1967a: 34.

HT: ♂, Assam, leg. Schmid [Khasi-Faintia Hills, Mawpran, 900-2000ft]; 3 PT: idem.

***Glenea bedoci mussardi*** Breuning, 1967a: 35.

HT: ♂, N.E. Assam, 23.V.1961, leg. Schmid [Kameng, Amatulla, 1300-2000ft].

***Glenea besucheti*** Breuning, 1974a: 74.

HT: ♀, Philippines, Ile Luzon, Manila, Calo, V.1928, W. Parsons.

***Glenea bougainvillei*** Breuning, 1958b: 315.

HT: Bougainv.

*Glenea mira bernardii* Breuning, 1977a: 298.

PT: Gabon, mont Bengue, 6.X.1967, leg. G. Bernardi.

*Glenea nitidicollis rufina* Breuning, 1976b: 740.

HT: Indonésie.

*Glenea perakensis* Breuning, 1956b: 126 (Breuning, 1956d: 699).

3 ?PT: [Malaisie, Perak, Gounong Boubou, 1100m, W. Doherty].

*Glenea peregoi sumatrensis* Breuning, 1976b: 740.

HT: Sumatra, Benkoelen, Moeara Tenam.

*Glenea pici schmidi* Breuning, 1967a: 35.

HT: ♂, N.E. Assam, 23.V.1961, leg. Schmid [Kameng, Amatulla, 1300-2000ft].

*Glenea pseudogiraffa taverniersi* Breuning, 1974d: 777.

?PT: [Ht Zaïre, Kisangani].

*Glenida cyaneofasciata* Breuning, 1952: 116.

?PT: [British Bootang, J. Durel].

*Gnoma blanchardi* Breuning, 1945 : 533.

?PT: [St Aignan, VIII-IX.97, Meek].

*Gnoma? plumigera* Westwood, 1848: 11.

HT: Java, coll. A. Melly [Himalaya Mount, Melly].

*Goephanes ruficornis* Breuning, 1964a: 97.

HT: Madagascar, Diego-Suarez [Coll. G. Junod].

*Hoplorana mussardi* Breuning, 1958 (1957): 177.

HT: ♂, Madagascar Est, Antalaha, coll. Mussard [XI.56].

*Hoplothrix paramicator* Breuning, 1966c: 14.

HT: Inde, Manipur, 28.VIII.1960, leg. Schmid, coll. Mussard [Khaozang, 3750ft].

*Hyagnis indicus* Breuning, 1969a: 35.

HT: Inde, Madumalai, 19.II., voyage Carl et Escher.

*Hyllisia suturaloides* Breuning, 1981a: 44.

PT: Ost Transvaal, Trichardtsdal, 25.XI.1972, H.J. Botha.

*Inermoparmena besucheti* Breuning, 1971b: 304.

HT: Ceylan Central, Horton Plains, 2100m, 15.II.1970, tamisages en forêt [Mussard, Besuchet et Löbl]; 4 PT: idem; 3 PT: Hakgala, versant NE, 1700-1800m, 28.I.1970, tamisages en forêt; 3 PT: Pidurutalagala, versant SO, 2200m, tamisages en forêt.

*Jordanoleiopus mirei* Breuning, 1977a: 294.

PT: Cameroun, Nkom (Saa), 24.IX.1971, leg. Ph. de Miré.

*Lasiocercis hovanoides* Breuning, 1964a: 96.

HT: ♀, Madagascar, Diego Suarez, ex. coll. Junod.

*Lasiocercis truncatoides* Breuning, 1975: 258.

2 PT: Madagascar Centre, Adringitra Est, Anjavidilava, 2000m, FDSMP, sur *Cussonia* sp. (Araliacées), 18.XII-15.I.1971.

*Linda annamensis* Breuning, 1954a: 556.

?HT: ♀, Annam, Caleu, ZMUH [Annam, Caleu].

*Linda assamensis* Breuning, 1954a: 555.

?PT: [Assam].

*Linda bimaculicollis* Breuning, 1954a: 558.

?PT: [Assam, rég. de Shillong]; ?PT: [Assam, Khasi Hills].

*Linda javaensis* Breuning, 1954a: 557.

HT: ♀, Java.

*Linda tonkinensis* Breuning, 1959b: 172.

?PT: [Tonkin, Mts Mauson, Fruhstorfer]; ?PT: [Tonkin, Montes Mauson, 2-3000', IV-V., H. Fruhstorfer].

*Mahenes demelti* Breuning, 1980d: 50.

HT: Iles Seychelles, Beau Vallon, VII.1978, leg. C.V. Demelt [Mahé].

*Mallosia imperatrix kurdistan* Breuning, 1970d: 30.

HT: ♂, Kurdistan.

*Mecas albovitticollis* Breuning, 1955c: 146.

?PT: [Mexico].

*Megalofrea transvaaliensis* Breuning, 1981a: 48.

PT: Transvaal, Warmbaths, I.1917, G. Kobrow.

*Menesia bicoloricornis* Breuning, 1963a: 6.

HT: ♀, Sumatra, Bukoelen, Moeara-Tenam, leg. M.E. Walsh [1935]; PT: idem.

*Menesia gleneoides* Breuning, 1965c: 39.

?PT: [Laos, Parkading, 27.VI.64, Coll. Rondon]; ?PT: [Parkading, 20.V.63].

*Menesia laosensis* Breuning, 1963c: 20.

?PT: [Loc Wa, Km 17, Pa Sang, Vientiane, 1.IV.62]; ?PT: [Km 17, Pa Sang, Vientiane, 31.V.62].

*Menesia latevittata* Breuning, 1954a: 425.

2 ?PT: [Borneo, Sandakan, Baker].

*Menesia longitarsis* Breuning, 1954a: 417.

2 PT: Borneo, Sandakan [Baker].

*Menesia ochreicollis* Breuning, 1954a: 422.

?PT: [Bornéo, Sandakan, Baker].

*Menesia octoguttata* Breuning, 1954a: 411.

HT: ♀, China, Provinz Szetschuan, Tatsienlu, leg. Stötzner; ?PT: [Su-Tchuen, Mo-Sy-Mien].

*Menesia sexvittata* Breuning, 1962b: 14.

HT: Java, Malang; ?PT: [Java occ., Mt Gedeh].

*Menesia subguttata* Breuning, 1954a: 414.

HT: ♀, Borneo, Sandakan.

*Menesida flavipennis* Breuning, 1954a: 446.

?PT: [Sumatra, Medan].

*Menesida rufula* Breuning, 1954a: 448.

HT: ♂, Java, Pengalengan, 1300m, leg. H. Fruhstorfer; ?PT: [Java, Preanger, Mts Djampang].

*Micromandibularia rufa* Breuning, 1954a: 528.

HT: ♀, Indien, Manipur.

*Microsomatidia reticulata* Sudre, 2000: 80.

HT: New Caledonia, Mt. Koghi, prim. for., 400-500m, litter, 18-19.X.1998, I. Löbl; PT: idem; PT: New Caledonia, Col de Mouirange, nr Table d'Union, 260m, litter, 16.IX.1997, I. Löbl.

*Microrhodopis albovittata* Breuning, 1976b: 740.

HT: Malaisie, Frasers Hill, 17-30.XI.1974, leg. P. Pfanner.

*Mimeryssamena besucheti* Breuning, 1972c (1971): 418.

HT: Himalaya, Kumaon, Pauri Garhwal, Mandoli, 1.VI.1958, 2300m [F. Schmid].

*Mimeuseboides exacavatipennis* Breuning, 1967a: 33.

HT: N.E. Assam, 13.V.1961, leg. Schmid [Kameng, Jhum La, 7800ft].

*Mimocrossotus rhodesianus* Breuning, 1972a: 283.

?PT: [Rhodésie, Salisbury, 17.X.1971].

*Mimomorpha flavopunctata* Breuning, 1980e: 178.

2 ?PT: [Insel Mindanao].

*Mimophaeopate assamensis* Breuning, 1967a: 31.

HT: N.E. Assam, 23.V.1961, leg. Schmid [Kameng, Amatulla, 1300-2000ft, 23.V.61].

*Mimostedes decellei* Breuning, 1968b: 347.

PT: Côte d'Ivoire, Bingerville, 16.II.1964, J. Decelle; PT: id. mais 23.II.1964; PT: id. mais 1-8.III.1964.

*Mispila tonkinensis* Breuning, 1964a: 96.

HT: Tonkin, Langson, Ban-danh [E. Autran, 1898 / P. de Borre].

*Moechothypa formosana* Breuning, 1974b: 372.

HT: Formose, Puli Taitung, V-VI.71, leg. K.H. Chen.

*Monochamus densepunctatus* Breuning, 1980e: 173.

?PT: [Insel Mindanao].

*Monochamus kinabaluensis* Hudepohl, 1996: 5.

HT: ♀, Ost-Malaysia, Sabah, Mt Kinabalu, 1500m, 30.VI.1987, Burckhardt, Löbl leg. [30.IV.1987].

*Monochamus marmoratipennis* Breuning, 1974a: 74.

HT: Côte d'Ivoire, Sassandra, I.1950, R. Mussard.

*Monochamus subtrangularis* Breuning, 1972c (1971): 416.

HT: Assam, Kameng, Bhairabkunda, 19.V.1961, 200-300m [Himalaya, F. Schmid].

*Monohammus bifasciatus* Westwood, 1848: 59.

HT: Himalayas, coll. A. Melly [Saunders Harrington].

*Monohammus punctulatus* Westwood, 1848: 12.

HT: Himalayas, coll. A. Melly.

*Monohammus westwoodii* Westwood, 1848: 12.

HT: Himalayas, coll. A. Melly.

*Morimopsis assamensis* Breuning, 1966c: 14.

HT: ♂, Assam, North East Frontier Agency, Kaliktang, 14.V.1961, leg. Dr F. Schmid, coll. Mussard; PT (allotype): ♀, dito, Talung-Dzong, 2300m alt., 4.VI.1961, Dr Schmid, dtlo., coll. Mussard.

*Morimopsis mussardi* Breuning, 1966c: 14.

HT: ♂, Assam, North-East Frontier Agency, Dirang Dzong, 1800m alt., 21.VII.1961, leg. Dr Schmid, coll. Mussard.

*Mussardia griseoplagiata* Breuning, 1959a: 5.

HT: Congo belge, Uélé, coll. Mussard [Bili 1952, Verbeke].

*Mutatocoptops lumawigi* Breuning, 1980e: 157.

?PT: [Insel Mindanao].

*Nemaschema flavovittatum* Breuning, 1976b: 739.

HT: Nouvelle Calédonie, Sana Pirogue, 4.XII.1952.

*Nemaschema ochreovittatum* Breuning, 1978a: 23.

PT : Nouvelle Calédonie, Mont Rembai, 19-21.I.1977, leg. Dr J. Balogh.

*Neodorcadion altaicum* Suvorov, 1909: 89.

ST: Altai, village Causaque de Bolschenarim, 08.VI.1906, rec. A.G. Jacobson [Semipalatinckaya obl. Altay Irtysh ct. Volsheparym. 8.VI.1906. A.Yakobson (en cyrillique)].

*Neonitocris rhodesica* Breuning, 1950c: 29.

?PT: [Kafakumba, XI.1933, F.G. Overlaet].

*Neoserixia pulchra* Schwarzer, 1925: 148.

ST: Formose, Kankau, V.1912, H. Sauter [Koshun].

*Niphonatossa mussardi* Breuning, 1967a: 29.

HT: ♀, Assam, Cachar District, 9.V.1960, leg. Schmid [Bandarkhal, 500ft, 9.V.60, Schmid].

*Niphoparmena basilewskyi* Breuning, 1960c: 336.

PT: Tanganika.

*Nitocris funesta* Fähræus, 1872: 57.

?PT: [Caffraria].

*Nitocris maculicollis* Perringuey, 1888: 184.

ST: ill., Stalbord, 11.87 / ♀.

*Nitocris sanguinalis* Kolbe, 1893 : 77.

ST: Togo, Bismarckburg, VI.1891.

*Nonyma allardi* Breuning, 1972a: 284.

HT: Zaïre, Ituri, Mambasa.

*Nonyma nigeriae* Breuning, 1978d: 108.

?PT: [Nigeria, Ibadan, 15.I.1963, D.C. Eidt].

*Nupserha schmidi* Breuning, 1966c: 16.

HT: ♀, North-East Assam, Biloda, 2000m alt., VI.1961, leg. Schmid, coll. Mussard [Assam- Kameng, Yhum-La, 16.IX.61].

*Nupserha similis* Breuning, 1978d: 113.

?PT: [Tanganica, W. Usambara Mts, 2000m, Maganta, III.1962].

*Nupserha tanganjicae* Breuning, 1978d: 112.

PT: Tanzanie, Mts Rungwe, 2600m, XI.1962 [5-10.XI.62]; 3 ?PT: [idem].

*Nupserha tanganjicae uluguruensis* Breuning, 1978d: 113.

2 ?PT: [Tanganyika, Uluguru Mts, 1500-1800m].

*Nupserha ugandensis* Breuning, 1978d: 111.

?PT: [Uganda, Entebbe, II-VII.1972, Exp. H. Falke].

*Oberea andamana* Breuning, 1962a: 152.

?PT: [Andaman Islands].

*Oberea andamanica* Breuning, 1962a: 152.

2 PT: Iles Andamanes.

*Oberea angolana* Breuning, 1961b: 62.

HT: ♂, Angola, Coconda [Bailundo].

*Oberea angolensis* Breuning, 1950d: 273.

2 ?PT: [Angola, Bailundo].

*Oberea annamensis* Breuning, 1969a: 37.

HT: ♂, Annam [Coll. Junod]; 2 ?PT: [Annam].

*Oberea anterufa* Breuning, 1962a: 142.

HT: ♀, Philippines, Ile Dalapiri.

*Oberea apicenigrata* Breuning, 1962a: 170.

?PT: [Laos, Yuang-Prabang].

- Oberea artocarpí andamanensis* Breuning, 1962a: 147.  
?PT: [And. Is.].
- Oberea aterrima* Breuning, 1961b: 100.  
HT: ♂, Célèbes, Tombugu [H. Kuhn, '95].
- Oberea auriventris* Breuning, 1961b: 118.  
2 PT: Borneo, Sandakan, Baker.
- Oberea baliana* Breuning, 1961b: 117.  
HT: ♀, Ile Bali, III-IV.1896, leg. Doherty.
- Oberea bangueyensis* Breuning, 1950b: 25.  
?PT: [Nord Borneo, Banguéy]; ?PT: [Banguéy I., Staudinger].
- Oberea batoensis nigrata* Breuning, 1961b: 101.  
PT: Sumatra, Medan; ?PT: [idem].
- Oberea bicoloripennis* Breuning, 1950c: 43.  
?PT: [Zambesi, Boroma].
- Oberea bimaculicollis* Breuning, 1962a: 191.  
HT: ♂, Cambodge.
- Oberea bisbimaculata* Breuning, 1962a: 190.  
HT: ♀, Tonkin, Chapa.
- Oberea bisbipunctata discoreducta* Breuning, 1969a: 37.  
HT: ♀, Annam [coll. Junod].
- Oberea bisbipunctulata* Breuning, 1962a: 191.  
PT: British Bootang, 1898, L. Durel; PT: idem, mais Padong, 1914.
- Oberea bootangensis* Breuning, 1962a: 177.  
HT: ♂, Bootan [L. Durel]; PT: ♀: idem [Maria Basti].
- Oberea callosicollis* Breuning, 1962a: 171.  
?PT: [Bengal, Chapra]; ?PT: [Tenasserim, Tandong, 4000', Mai, Fruhstorfer leg.].
- Oberea cariniscapus* Breuning, 1956g: 23.  
?HT: Java, IRSN [Malacca, Perak].
- Oberea circumscutellaris* Breuning, 1961b: 96.  
HT: ♂, Ile Engano.
- Oberea davaoensis* Breuning, 1961b: 139.  
?PT: [Ilayavo □□□, Birlig / Philipp., Sumpei]; ?PT: [Philipp., Sumpei].
- Oberea densepilosa* Breuning, 1955a: 76.  
?PT: [Abyssinia, Harrar].
- Oberea densepunctipennis* Breuning, 1962a: 144.  
?PT: [Philippinen, Luzon, Prov. Laguna].
- Oberea elongaticollis* Breuning, 1961b: 140.  
?PT: [Mindanao, Davao].
- Oberea erythrocephala palawanicola* Breuning, 1964b: 6.  
HT: ♂, Iles Palawan; ?PT: [Mindoro].
- Oberea flava* Breuning, 1961b: 122.  
HT: ♂, Célèbes, Toli-Toli; ?PT: [S. Celebes, Bua-Kraeng, 5000', II.1896, H. Fruhstorfer].
- Oberea flavescens* Breuning, 1947c (1946): 146.  
HT: ♀, Chine, province Sétchouen, Tatsienlou.



- Oberea flavoantennalis* Breuning, 1961b: 125.  
HT: ♀, Célèbes, Tomboegoe.
- Oberea flavoantennata* Breuning, 1962a: 146.  
?PT: [Philippinen, Luzon?, Malacia?].
- Oberea florensis* Breuning, 1961b: 130.  
HT: ♀, South Flores, X.1896, leg. Everett; PT: ♂, idem.
- Oberea floresica* Breuning, 1961b: 131.  
?PT: [Flores].
- Oberea fulviceps* Breuning, 1950c: 38.  
?PT: [Cameroons, Bitye Ja River]; ?PT: [Kamerun].
- Oberea fuscicollis* Breuning, 1961b: 138.  
2 ?PT: [Philippinen, Mindanao, Surigao].
- Oberea fuscipennis perakensis* Breuning, 1962a: 179.  
?PT: [Annam, Quinhone]; ?PT: [Tonkin, Montes Manson, IV-V., 2-3000', H. Fruhstorfer].
- Oberea gabunensis* Breuning, 1950c: 39.  
2 ?PT: [Gabon, Bas Ogoué].
- Oberea griseopennis* Schwarzer, 1925: 154.  
ST: Formose, Kankau, Koshun, H. Sauter [V.1912].
- Oberea grossepunctata* Breuning, 1947c (1946): 145.  
HT: ♀, Chine, prov. du Yunnan, Fleuve Soling-ho [Vallis flumin.]; ?PT: [Chin., Yunnan, F.I. Solingho].
- Oberea himalayana* Breuning, 1972c (1971): 420.  
HT: ♀, Assam, Kameng, But, 23.VI.1961, 1750m [Himalaya, Schmid].
- Oberea holatripennis* Breuning, 1982: 29.  
?PT: [Pekin / Ex. Musaeo, Arm. David, 1900].
- Oberea holonigra* Breuning, 1961b: 97.  
HT: ♂, Ile Engano.
- Oberea infranigra* Breuning, 1962a: 181.  
HT: ♀, Cambodge.
- Oberea javana* Breuning, 1961b: 105.  
HT: ♂, Java, Ganung, Tangkuban Prahū [1000-1800m, V.1933].
- Oberea javanicola* Breuning, 1950b: 28.  
?PT: [Java mérid., 1500', 1891, H. Fruhstorfer]; ?PT: pas d'étiquette de localité.
- Oberea kanarensis* Breuning, 1950b: 28.  
?HT: Inde, Kanara, IRSN [C.P. Ceylon, Pundaloya]; ?PT: [N. Kanara, T.R. Bell]; ?PT: [Kanara].
- Oberea kandyana* Breuning, 1962a: 153.  
PT: Ceylan, Kandy; ?PT: [W.P. Ceylon, Henaralgada, Bot. Gards].
- Oberea keyensis* Breuning, 1961b: 128.  
2 ?PT: [Little Kei., H. Kühn].
- Oberea kunbirensis* Breuning, 1953: 37.  
?PT: [India, Kunbir].
- Oberea lepesmei* Breuning, 1956d: 701.  
?PT: [Côte d'Ivoire, Dirubalu].

***Oberea lepesmiana*** Breuning, 1956d: 700.

?PT: [Malay Ar., Xulla-Mangoli, X-XI, Doherty]; ?PT: [Sula Mangoli, X-XI, Doherty].

***Oberea luluensis*** Breuning, 1950c: 40.

?PT: [Cameroons, Bitye Ja River, 3000ft].

***Oberea lutea nilghirica*** Breuning, 1955a: 77.

2 PT: Inde, Nilghiri Hills.

***Oberea manipurensis*** Breuning, 1961b: 98.

HT: ♂, Inde, Manipur; PT: idem.

***Oberea matangensis*** Breuning, 1962a: 179.

?PT: [Borneo, Baker].

***Oberea medioflavoantennalis*** Breuning, 1961b: 124.

HT: ♀, Célèbes, Tomboegos.

***Oberea mediofusciventris*** Breuning, 1962a: 171.

HT: ♂, South East Borneo.

***Oberea mentaweiensis*** Breuning, 1961b: 108.

HT: ♂, Iles Mentawai, Ile Sipora, VI.1924, leg. Karny.

***Oberea meridionalis*** Breuning, 1961b: 71.

?PT: [Cap. B. Spei].

***Oberea nigerrima*** Breuning, 1950b: 25.

?PT: [Java occident., Pengalengau, 4000, 1893, H. Fruhstorfer]; ?PT: pas d'étiquette de localité.

***Oberea nigrescens*** Breuning, 1961b: 110.

PT: Kuching, X.1906; ?PT: [idem mais V.1907, J.H].

***Oberea nigripennis*** Breuning, 1950c: 38.

PT: Congo B., Katanga, riv. Kawa; ?PT: [Gabon, Bas Ogoué].

***Oberea nigripennis camerunica*** Breuning, 1961b: 92.

?HT: ♀, Cameroun, Ja River, Bitye, ex. coll. Oberthür, MNHN [Cameroun, Batanga]; ?PT: [Cameroons, Bitye Ja River, 3000ft.].

***Oberea nigripes*** Breuning, 1950b: 26.

?PT: [Java, Soekaboemi, Coll. Le Moults]; ?PT: [Java occid., Sukabumi, 2000', 1893, Fruhstorfer].

***Oberea nigroapiciventris*** Breuning, 1962a: 167.

?PT: [Borneo mer.].

***Oberea nigrobasipennis*** Breuning, 1950c: 38.

2 PT: Congo belge, Eala.

***Oberea nigrofemoralis*** Breuning, 1950c: 39.

?PT: [Cameroons, Bitye Ja River, 3000ft]; ?PT: [Kamerun, Mukoja, Farm].

***Oberea nigrolateralis*** Breuning, 1950b: 27.

2 PT: Java, Soekaboemi.

***Oberea nigrolineatipennis*** Breuning, 1970e: 172.

?PT: [Katanga, Zilo, IV.69].

***Oberea nyassana*** Breuning, 1950b: 30.

2 ?PT: [Mozambique, Zambesie].

- Oberea occidentalis* Lepesme & Breuning, 1953: 104.  
?PT: [Kumassi, Newberry].
- Oberea octava kuchingensis* Breuning, 1962a: 197.  
?PT: [Bornéo occ.]; ?PT: [Kuching, II.1907, H.F.].
- Oberea opacipennis* Breuning, 1961b: 132.  
HT: ♀, Ile Sumbawa; PT: idem.
- Oberea ornativentris* Breuning, 1961b: 70.  
HT: ♀, Rhodésie; PT: ♀, Kenya.
- Oberea palawanensis* Breuning, 1961b: 115.  
?PT: [N. Palawan, Binuluan, XI-XII.1913, leg. G.Boettcher].
- Oberea parteflavoantennalis* Breuning, 1961b: 101.  
HT: ♂, Bornéo, Sandakan, leg. Baker.
- Oberea partenigricollis* Breuning, 1961b: 137.  
2 ?PT: [Philippin., Bilaran].
- Oberea pedemontana koniensis* Breuning, 1962a: 218.  
HT: ♀, Anatolie, Eregli [Türkei, Konia, 1050m, 6.VII.1952, Eregli, leg. Erich Schmidt].
- Oberea philippinensis* Breuning, 1961b: 137.  
PT: Philippines, Ile Mindanao oriental; ?PT: [Mind.].
- Oberea pontianakensis* Breuning, 1962a: 176.  
HT: ♂, Bornéo, Pontianak; ?PT: [Borneo, Pontianak].
- Oberea pseudobalineae* Breuning, 1955a: 76.  
?PT: [Luzon, Manille]; ?PT: [Rio Baubo, 64].
- Oberea pseudolacana* Breuning, 1956d: 700.  
2 ?PT: [N. Borneo, Kina-Balu].
- Oberea pseudonigrocincta* Breuning, 1961b: 69.  
HT: ♂, Érythrée.
- Oberea pseudopascoei* Breuning, 1950c: 41.  
2 ?PT: [Gabon, Bas Ozooné].
- Oberea pseudoposticata* Breuning, 1962a: 165.  
HT: ♂, Tenasserim, Meetan, IV.1887.
- Oberea puncticollis* Breuning, 1962a: 146.  
?PT: [Philippines, Luzon, Prov. Apayao].
- Oberea pupillatoides* Breuning, 1947c (1946): 145.  
HT: ♀, Chine, province du Chansi [26.VI.16].
- Oberea resslī* Demelt, 1963a: 150.  
3 PT: Asia minor sept., Kizilcahamam [62].
- Oberea ruficeps muchei* Breuning, 1981c: 26.  
HT: Pamir-Alai, Tadshikistan, environs de Siddi, 2000-2500m, I-VII.1980, leg. Heinz Muche; 2 PT: idem, MHNG. (*Les trois exemplaires n'ont pas été retrouvés*).
- Oberea rufiniventris* Breuning, 1968a: 41.  
?PT: [Pakkading, 15.IV.66]; ?PT: [Bibu Ena, 15.IV.65].
- Oberea rufoantennalis* Breuning, 1962a: 143.  
?PT: pas d'étiquette de localité.

*Oberea rufosternalis* Breuning, 1961b: 95.

PT: Yunnan, Peyentsin; ?PT: [Sud Yunnan, Tche-Ping-Tcheou].

*Oberea sanghirica* Breuning, 1961b: 100.

HT: ♀, Sanghir, Taroena, III-IV, leg. Doherty [2000].

*Oberea semifuscipennis* Breuning, 1950b: 29.

?PT: [Maïssour, Shimoga]; ?PT: [Nilgiri Hills, H.L. Audrewes, ill., Teppenkadu, V.11, 2500'].]

*Oberea semirubra* Breuning, 1962a: 148.

HT: ♂, Cochinchine, Cap St Jacques [Baria].

*Oberea senegalensis* Breuning, 1961b: 66.

?PT: [Sénégal].

*Oberea shibatai* Hayashi, 1962: 40.

PT: Amami-Oshima, Naze, 29.IV.1961, Y. Susumu leg.

*Oberea shirahatai* Ohbayashi, 1956: 762.

2 PT: Nord Honshiu, Sakata, Yamagata Pref., 9.VII.1952, leg. K. Shirahata.

*Oberea silhetica* Breuning, 1961b: 117.

HT: ♀, Inde, Silhet, Chandkiva.

*Oberea sobosana* Ohbayashi, 1956: 761.

PT: ♂, Kiushiu, Mt Sobo, Oita Pref., Kyûshû, Mt Sobo, Oita, 23-26.VII.1952, Y. Miyake leg. [26.VII.1952].

*Oberea subabdominalis* Breuning, 1962a: 166.

2 ?PT: [Birmanie, Theinzek, 1913, P. Loizeau / 167].

*Oberea subbasalis* Breuning, 1950c: 42.

?PT: [P. Natal].

*Oberea subferruginea* Breuning, 1965a: 52.

2 ?PT: [Kongsédone, 30.IV.65].

*Oberea subneavei* Breuning, 1961b: 75.

HT: ♂, Cameroun, Mukonje Farm; ?PT: [Cameroun, Yaoudé].

*Oberea subnigrocincta* Breuning, 1950c: 42.

2 ?PT: [Cameroons, Bitye Ja River, 3000ft].

*Oberea subsericea* Breuning, 1962a: 180.

HT: ♀, Chine, prov. Kwei-chow, Nanning.

*Oberea subsuturalis* Breuning, 1954b: 19.

?PT: [Kenya, Ihatha].

*Oberea subtereaurea* Breuning, 1961b: 118.

HT: ♂, Bornéo, Sandakan, leg. Baker; ?PT: [Bornéo occ., Riv. Sambey près Noabang / 1897, J.B. Ledru].

*Oberea subvaricornis* Breuning, 1961b: 73.

PT: Durban, XII.03; PT: Durban, Congella, G.F. Leigh.

*Oberea subviparina* Breuning, 1960a: 15.

?HT: Philippines, Mindanao, Surigao, Mus. Dresde [Mindanao, Surigao].

*Oberea sumbana* Breuning, 1961b: 131.

PT: Waingapoe, 96, Everett; ?PT: [Sumba].

*Oberea sumbawana* Breuning, 1961b: 132.

HT: ♀, Ile Sumbawa.

***Oberea sumbawanica*** Breuning, 1961b: 133.

HT: ♂, Ile Sumbawa.

***Oberea sumbawensis*** Breuning, 1961b: 131.

HT: ♂, Ile Sumbawa, Mt. Harunasa; ?PT: [Insel Sumbawa].

***Oberea taihokuensis*** Breuning, 1962a: 168.

HT: ♀, Formose, Taihoku [20.IV.1932, Col. M. Chujo].

***Oberea tatsienlui*** Breuning, 1947c (1946): 145.

HT: ♂, Chine, prov. de Sétchouen, Tastsienlou [Tatsienlu Dsaschi / Bergschluchten, Em. Reitter].

***Oberea tenggeriana*** Breuning, 1963a: 10.

HT: ♀, Java, Mts Tengger, leg. Walsh.

***Oberea travancorensis*** Breuning, 1962a: 151.

HT: ♂, Inde, Travancore.

***Oberea tricoloricornis*** Breuning, 1961c: 43.

HT: ♂, Cameroun, Bitye, 1000m [3000ft].

***Oberea trigonalis*** Breuning, 1950c: 42.

?PT: [Transvaal, Hartmann]; ?PT: [ill., Zouberi].

***Oberea truncatipennis*** Breuning, 1962a: 170.

HT: ♂, South East Borneo.

***Oberea unimaculicollis*** Breuning, 1962a: 194.

HT: ♀, Sumatra, Medan.

***Oberea wittei*** Breuning, 1954c: 78.

2 PT: ♀, Lusinga, 1760m, 28.XI-17.XII.1947 [Congo].

***Oberea yunnanensis*** Breuning, 1947c (1946): 147.

HT: ♀, Chine, province Yunnan, Fleuve Soling-ho; ?PT: [China, Prov. Yunnan, Vattis flumin, Soling-ho].

***Obereopsis coimbatoreana*** Breuning, 1974b: 374.

HT: Inde, Madras, Coimbatore, 500m, XI.1971, leg. T.R.S. Nathan; PT: idem.

***Obereopsis himalayana*** Breuning, 1972c (1971): 420.

HT: ♀, Himalaya, Kumaon, Pauri Garhwal, Binaik Chatti, 2.VII.1958, 2150-2250m [F. Schmid]; PT: idem.

***Obereopsis nigriceps nigroabdominalis*** Breuning, 1972c (1971): 420.

HT: Sikkim, Yugang, 24.VII.1959, 1750m [Himalaya, F. Schmid].

***Obereopsis paratricollis*** Breuning, 1967a: 36.

HT: ♀, N.E. Assam, leg. Schmid [Kameng].

***Obereopsis trinotaticollis*** Breuning, 1967a: 36.

HT: ♂, Inde, Manipur, 15.VI.1960, leg. Schmid; PT: idem [Assam, Chingsao, 3800-5400ft].

***Oeax collaris nigromaculatus*** Breuning, 1978d: 103.

?PT: [Ghana, Tafo, VI.1969, E.O. Boaf].

***Ossonis modiglianii*** Breuning, 1950a: 200.

2 ?PT: [Sumatra, Si-Rambé, XII.90-III.91, E. Modigliani].

*Oxylamia vagemarmorata* Breuning, 1974a: 74.

HT: ♂, Côte d'Ivoire, Sassandra, R. Mussard, I.1950.

*Oxyliia androsensis* Breuning, 1963a: 10.

HT: ♂, Grèce, Ile Andros, 27.IV.1960 [24.IV.60].

*Parabrimus ruficornis* Breuning, 1981a: 46.

PT: Transvaal, Mariepskop, II.1962, N. Leleup.

*Paracloдия besucheti* Breuning, 1974b: 374.

HT: Inde, Kerala, Cardamon Hills, Periyar, 950m, 4.XI.1972, leg. Besuchet, Löbl, Mussard, attiré par les lumières de l'Hôtel Aranya Nivas.

*Paracondyloides flavofasciatus* Breuning, 1978a: 25.

?PT: [Nlle Calédonie, Caavatch, 15.II.1977, leg. Dr J. Balogh].

*Paradystus ceylonicus* Breuning, 1954a: 460.

HT: ♀, Insel Ceylon.

*Paradystus infrarufus* Breuning, 1954a: 460.

HT: ♀, Tenasserim, Tamdong, 1700m, mai, leg. Fruhstorfer.

*Paradystus innotatus* Breuning, 1954a: 459.

?PT: [SO Sumatra, Merang]; ?PT: [Bornéo, Sandakan, Baker].

*Paraglenea latefasciata* Breuning, 1952: 127 (Breuning, 1956d: 697).

?PT: [Tonkin, Chapa, 1.VII.1917, Jeanvoine]; ?PT: [Tonkin, Thanh-Moi, 24.VI-II.1917, Jeanvoine].

*Paraglenea transversefasciata* Breuning, 1952: 128.

2 ?PT: [Laos, Lonang-Prahang].

*Parahyllisia indica* Breuning, 1974e: 163.

PT: Indien, Kodaicanal [Indes Orientales, Mts. Kodaicanal, J. Castets].

*Paralamiodorcadion schmidi* Breuning, 1967a: 28.

HT: ♀, Inde, Manipur, 9.VI.1960, leg. Schmid [Assam].

*Paramenesia nigrescens* Breuning, 1966b: 53.

HT: ♂, Tonkin, Monts Mauson, leg. Fruhstorfer [IV-V, 2-3000'].

*Paramimiculus pterolophioides* Breuning, 1964a: 95.

HT: ♂, Lourenço Marques, Makulane, leg. Dr G. Audeoud.

*Paraserixia flava* Breuning, 1954a: 442.

?PT: [Burma].

*Parasermus tonkinensis* Breuning, 1969a: 36.

HT: ♂, Tonkin, ach. Baudet.

*Parazygocera baloghi* Breuning, 1978b: 69.

2 PT: New Caledonie, Mt Mandjello, 17.II.1977, leg. Dr J. Balogh.

*Pareutetrappa nigrimaculata* Breuning, 1952: 138.

?PT: [Tonkin occ., Rég. de Hoa Binh].

*Pareutetrappa olivacea* Breuning, 1952: 138.

HT: ♀, China, Lou-tse-kiang [1901]; ?PT: [Tali-fr, Yunnan, China].

*Parischnolea chiliensis* Breuning, 1980b: 69.

PT: Chili, El Nague, Coquimbo, 10.X.1976, J. Solervicens Rec.

*Phantasis nodulosa* Sudre & Teocchi, 2000: 25.

PT: Abyss., Harrar, coll. Plason / ♀.

*Phelipara assamana* Breuning, 1967a: 31.

HT: Inde, Manipur, 15.IV.1959, leg. Schmid [Assam, Chingsao, 3800-5400ft, 15.VI.60].

*Philotoceraeus descarpentriesi* Breuning, 1975: 265.

2 PT: Madagascar Centre, Adringitra Centre, plateau Andohariana [Soaindrana], 2000-2100m, HFAM 1, 9.XI-10.XII.1970.

*Phlyarus rufoscapus* Breuning, 1976b: 740.

HT: Tonkin, Mts Mauson, 700-1000m, IV-V, leg. H. Fruhstorfer.

*Phrynetia margaritifera* Westwood, 1848: 11.

ST: Nepaul, coll. A. Melly [Margaritifera Melly, Westd Or. Enty 5<sup>th</sup> plate].

*Phytoecia achillena* Holzschuh, 1971: 68.

PT: Anatolien, Amanusgebirge, Prov. Adana, Nurdagi gecidi, 1000m-1200m, 13-27.V.1970, leg. C. Holzschuh [800-1300m].

*Phytoecia adusta* Reitter, 1889: 43.

?PT: [Arménien].

*Phytoecia akbesiana* Pic, 1900: 20.

?PT: [Syrie]; ?PT: [ill., Kiril Dag].

*Phytoecia albosuturalis* Breuning, 1947c (1946): 143.

HT: Shi-wan-tsze, Hiu-man-Kiang-keou [Hiu-mou-kiang-keou].

*Phytoecia anteatra* Breuning, 1966b: 53.

HT: Angola, Loanda [Quela, Loanda, Fazenda Luhanga, Prinz Carolath S.G.];  
PT: idem.

*Phytoecia apicefuscipennis* Breuning, 1967b: 40.

HT: ♀, Cameroun, Kribi [Cameroun, Batanga].

*Phytoecia argenteosuturalis* Breuning, 1955e: 356.

PT: Upper Sources, Olifants River, Ceres C. P.

*Phytoecia atricollis* Breuning, 1960b: 23.

HT: ♀, Tanganyika, Lindi [D. O. Afr.].

- Phytoecia atripennis* Breuning, 1951: 450.  
HT: ♀, Congo belge, Beni.
- Phytoecia atrohumeralis* Breuning, 1964b: 7.  
HT: ♂, Congo, Elisabethville.
- Phytoecia basilewskyi* Breuning, 1950c: 46.  
?PT: [Tchad, Haut Chari, Fort Sibut, Collection Le Moul]; ?PT: [idem mais Congo Français].
- Phytoecia bucharica* Breuning, 1943: 101.  
HT: ♂, Boukhara, Tchitchantan [Ost Buchara, Tschitschantan, Nufswald, F. Hauser, 1898]; ?PT: [Ost Buchara, Tschitschantan, Nufswald, F. Hauser, 1898].
- Phytoecia chinensis* Breuning, 1943: 102.  
HT: ♂, Chine, province Péchéli.
- Phytoecia ciliciae* Breuning, 1951: 406.  
HT: ♂, Ciliciae Adana; PT: idem.
- Phytoecia coeruleipennis* Breuning, 1947a (1946): 22.  
HT: ♂, Cachemire, Kulu; PT: ♀, idem.
- Phytoecia coeruleomicans* Breuning, 1947a (1946): 22.  
HT: ♂, Japon, île Hondo, Chiuzenji.
- Phytoecia coerulescens cretensis* Breuning, 1947e: 60.  
HT: île Crète [Kreta, Hag. Dheka, Holtz / 5.III]; ?PT: [Kreta, Iraklion, IV.53].
- Phytoecia comes szetschuanica* Breuning, 1967b: 40.  
HT: ♂, Chine, Prov. de Szetschouan, Tatsienlu.
- Phytoecia forticornis* Breuning, 1947a (1946): 22.  
HT: ♂, Inde Britannique, Cachemire, Kulu; PT: idem; ?PT: [Kashmir, Kulu].
- Phytoecia fuscolateralis* Breuning, 1977b: 297.  
?PT: [Programma litorale 1, 10.XI.71, Trans. A, Ora 18.00, Zona 5, Direz N.].
- Phytoecia grisea* Breuning, 1947a (1946): 21.  
HT: ♀, Inde Britannique, Spiti [Manikar]; PT: ♂, idem [Pulga].
- Phytoecia hispanica (hispancia orthographe originale incorrecte)* Breuning, 1951: 364.  
HT: ♀, Espagne, province de Teruel, Montes Universales, V.1949.
- Phytoecia indica* Breuning, 1951: 404.  
HT: ♀, Inde, Coimbatore.
- Phytoecia infranigra* Breuning, 1951: 429.  
HT: ♂, Kenya, Ikutha.
- Phytoecia kashmirica* Breuning, 1943: 101.  
HT: ♂, Cachemire, Koulou [Manali Kulu]; ?PT: [Indes angl., Spiti, Manikarn].
- Phytoecia kukunorensis* Breuning, 1943: 102.  
HT: ♂, Thibet, Koukounor, 3200m [1898, F. Hauser].
- Phytoecia lahoulensis* Breuning, 1951: 359.  
HT: ♂, Kashmir, Lahoul [Kelling / G. Babault, VII.1914]; PT: idem [Gandla].
- Phytoecia lateralis medionigriventris* Breuning, 1961a: 306.  
2 ?PT: [Ouganda, Entebbe].
- Phytoecia latesuturalis* Breuning, 1951: 430.  
?PT: [Tang., Kilimandjaro].



*Phytoecia moreana* Breuning, 1943: 102.

HT: ♂, Morée, Nauplie [Argos, 1935, Maran et Step., Coll. Barton]; ?PT: [Nauplia / Pelopon., Argos, 1935, Maran et Step., Coll. Barton].

*Phytoecia neavei guineana* Breuning, 1951: 428.

?PT: [Togo, Bismarckburg]; ?PT: [W. Africa, Abutshi, R. Niger].

*Phytoecia nigerrima* Breuning, 1947a (1946): 21.

HT: ♀, Japon, île Hondo, Chiuzenji.

*Phytoecia nigroapicalis* Breuning, 1944: 16.

HT: ♂, Irak, Bagdad; ?PT: [Mesopotania, Mosul, V.09, Coll. Hauser].

*Phytoecia nigrofemorata* Breuning, 1947a (1946): 23.

HT: ♂, Inde Britannique, Cachemire, Kulu.

*Phytoecia nigrohumeralis* Breuning, 1950c: 46.

?PT: [Belg. Kongo, Beni].

*Phytoecia nigrovittata* Breuning, 1951: 431.

?PT: [Ubanghi].

*Phytoecia orientis medionigripennis* Breuning, 1961a: 306.

2 ?PT: [ill., Ouganda, M.R□ □ □].

*Phytoecia ornata* Breuning, 1951: 438.

HT: ♂, Angola, Bailundo.

*Phytoecia parvula* Breuning, 1960b: 23.

HT: Algérie, Teniet el haad [Schaumm].

*Phytoecia pilipennis* Reitter, 1895: 161. (note manuscrite de Hüdepohl: «ne peut être un PT»).

?ST: Anatolie Kubischtek, Ordubad, Araxesthal [Armenien, Ordubad].

*Phytoecia pseudocallosa* Breuning, 1962b: 15.

HT: ♀, Angola.

*Phytoecia pseudofervida* Breuning, 1951: 419.

?PT: [Durban, X.1896, J.P. Gregor].

*Phytoecia pseudolateralis* Breuning, 1954c: 82.

?PT: [Congo, Lusinga].

*Phytoecia pseudolatesuturalis* Breuning, 1961c: 44.

HT: ♂, Uganda.

*Phytoecia pseudoneavei* Breuning, 1954c: 80.

?PT: [Congo, Lusinga].

*Phytoecia pseudorientis* Breuning, 1962b: 15.

HT: Uganda, Mt Ruwenzori.

*Phytoecia pseudosomereni* Breuning, 1964a: 102.

HT: ♀, Cameroun, Dsang.

*Phytoecia punctipennis* Breuning, 1947c (1946): 143.

HT: ♂, Chine [Tchenkiang, 21.V.18].

*Phytoecia rufa allardi* Breuning, 1974d: 777.

4 PT: Uganda, Entebbe, VII.1973.

*Phytoecia rufovittipennis* Breuning, 1972c (1971): 419.

HT: ♂, Himalaya, Kumaon, Pauri Garhwal, Gamsali, 11.VII.1958, 3350m [F. Schmid].

*Phytoecia rufulescens* Breuning, 1951: 421.

?PT: [Natal, Malv □ □ □, 1.XI.07]; ?PT: [Natal].

*Phytoecia somereni* Breuning, 1951: 449.

2 ?PT: [Kenya, Ikatha].

*Phytoecia stenostoloides* Breuning, 1943: 101.

HT: ♀, Transbaïkalie, Verchné-Oudinsk.

*Phytoecia subcoeruleata* Breuning, 1951: 410.

HT: ♀, Togo, Bismarckburg; ?PT: [Togoland, 1892-1893, L. Conradt].

*Phytoecia subdorsata* Breuning, 1961d: 256.

?PT: [Congo Belge, Luluabourg].

*Phytoecia suturevittata* Breuning, 1951: 429.

?PT: [E. Africa, Mombas].

*Phytoecia suvorovi* (*suvorovi* orthographe originale incorrecte) Pic, 1905: 38.

2 ST: Caucase [Kaukasus, Olty, E. Koenig / *Phytoecia suworowici* Kög / *Phyt. suvorovi* Pic, det.].

*Phytoecia tenuilinea mateui* Breuning, 1951: 365.

2 PT: Rio de Oro, Mateu.

*Phytoecia vulneris paganettii* Breuning, 1944: 16.

HT: ♂, Italie méridionale, Apulie, San Basilio, Paganetti; ?PT: [Murgien, Grottaglie / Paganetti].

*Planodema albosternalis* Breuning, 1950b: 7 (1956e: 720).

HT: ♂, Congo belge, Elisabethville [XI.1911].

*Prosoplus costatus* Hüdepohl, 1996: 4.

HT: ♀, Ost-Malaysia, Bornéo, Sabah, Mt Kinabalu, 3300m, Panar Laban, IV-V.87, Burckhardt, Löbl leg. [4.V.1987].

*Prosoplus laterialbus* Breuning, 1971a: 2.

2 ?PT: [Nouvelle Guinée, Tifalmin, I.69].

*Prosoplus major* Breuning, 1964a: 96.

HT: Célebès, Makassar, leg. A. Naville [602 Mr, 25].

*Prosoplus rosselli* Breuning, 1982: 16.

PT: Papouasie, archipel de la Louisiade, île Rossel, Meek coll., I-III.1898.

*Prosopocera ferrierei* Breuning, 1950b: 5.

HT: ♂, Congo belge, Elisabethville [X.1911].

*Prosopocera forchhammeri* Breuning, 1986: 46.

?PT: [Botswana, Serowe, Swaneng Hill, 12.II.77, light, B 71].

*Prosopocera forchhammeriana* Breuning, 1986: 47.

PT: Botswana, Serowe, Swaneng Hill, 23.XI.77, light, Harold von Zyl, B. 812.

*Prosopocera haemorrhoidaloides* Breuning, 1978d: 94.

PT: Ghana, Tafo, V-VIII.1966, leg. E.O. Boafo; 8 ?PT: [idem mais II.1968, E.O. Boafo].

*Prosopocera infragrisea* Breuning, 1950b: 5.

HT: ♂, Transvaal, Shilouvane, leg. H. Junod.

*Prosopocera mussardi* Lepesme & Breuning, 1956: 660.

HT: Côte d'Ivoire, Adzopé, III.1949, rec. R. Mussard, coll. Lepesme.

*Prosopocera parapropinqua* Breuning, 1986: 47.

PT: Botswana, Serowe, Swaneng Hill, 3.XII.1977 (MVL), P. F. leg. [UV, B. 1085].

*Prosopocera rhodesica forchhammeri* Breuning, 1986: 48.

PT: Botswana, Serowe, Swaneng Hill, 20.XI.79, UV, P. F. leg [Forchhammer leg., n° 5110].

*Pseudepilysta loebli* Hüdepohl, 1996: 3.

HT: ♀, Ost-Malaysia, Sabah, Mt. Kinabalu, 1550m, 27.IV.1987, Burckardt - Löbl leg. [23.IV.1987].

*Pseudopharsalia flavostictica* Breuning, 1969b: 194.

PT: Bornéo, Pontianak; ?PT: [Bornéo, Pontianak].

*Pseudozorilispe celebensis* Breuning, 1976a: 208.

PT: Sud Célèbes, Bua Kraeng, 1700m, II.1896, H. Frühstorfer.

*Pterolophia bituberculatoides* Breuning, 1976b: 738.

HT: Malaisie, Singapour.

*Pterolophia egumensis* Breuning, 1973b: 659.

PT: île Egum, Yanarba, XI.1895, leg. Meek.

*Pterolophia flavicollis* Breuning, 1977a: 280.

?PT: [village N Fida, IV- 3.VII.70 / test cacao].

*Pterolophia fusca* Breuning, 1969a: 35.

HT: Ceylan, Peradenya.

*Pterolophia fuscomarmorata* Breuning, 1977a: 280.

?PT: [Cameroun, Nkolbisson, 6.X.71].

*Pterolophia inplagiata* Breuning, 1980e: 166.

?PT: [Insel Mindanao].

*Pterolophia lineatipennis* Breuning, 1974b: 371.

HT: Formose, Puli, Taitung, V-VI.1971, leg. K.H. Chen; PT: idem.

*Pterolophia ochreosignata* Breuning, 1974a: 73.

HT: Philippines, Ile Sibuyan, San Fernando, W. Parson, VII.1928; 2 PT: idem.

*Pterolophia paraforticornis* Breuning, 1976b: 738.

HT: Malaisie, Frasers Hill, 17-30.XI.1974, leg. P. Pfanner.

*Pterolophia paramulticarinata* Breuning, 1977a: 280.

?PT: [N Loubon, 2.VII.71].

*Pterolophia pfanneri* Breuning, 1976b: 738.

HT: Malaisie, Frasers Hill, 17-30.XI.1974, leg. P. Pfanner; PT: idem.

?HT: [Malaisie, Cameron Highland, V.75, P. Pfanner].

*Pterolophia pluricariniipennis* Breuning, 1969a: 34.

HT: ♂, Inde, Perumalinaloi, 21.IV.1927, voyage Carl et Escher [Inde méridionale, Palnis].

*Pterolophia postscutellaris* Breuning, 1967a: 30.

HT: N.E. Assam, 4.VIII.1961, leg. Schmid [Kameng, Nakhu, 3800-4800ft, 4.VII.61].

*Pterolophia rondoniana* Breuning, 1962e: 54.

PT: Vientiane, K17, Tangone, 19.X.62; PT: Vientiane, K17, Paksane, 17.X.62.

*Pterolophia schmidi* Breuning, 1967a: 30.

HT: Inde, Manipur, 9.VI.1960, leg. Schmid [Assam, Sirahi Kashana, 6000-7500ft].

*Pterolophia tenebricoides* Breuning, 1976b: 739.

HT: Malaisie, Singapour.

*Pterolophia woodlarkiana* Breuning, 1973b: 659.

?PT: [Woodlark, Meek. 95].

*Ramularius albosticticus* Breuning, 1964a: 97.

HT: ♂, Lourenco Marques, Makulane, leg. Dr Audeoud; 2 PT: idem.

*Rhodopina assamana* Breuning, 1966c: 15.

HT: ♀, Assam, North-East Frontier Agency, VI.1961, coll. Mussard [Kameng, Nafra, 24.VI.61, 3500-4000ft, Schmid].

*Rhodopina manipurensis* Breuning, 1972c (1971): 416.

HT: ♂, Assam, Manipur, Hkayam Boum, 20.VI.1960, 2300-2600m [Inde, Schmid].

*Rhytiphora correnoides* Breuning, 1970a: 374.

PT: Australie, Dawson Distr., coll. Barnard [Queensland, Monto, 10.I.1975 / 8546].

*Ropica assamensis* Breuning, 1972c (1971): 415.

HT: Assam, Kameng, Shergaon, 9.V.1961, 1850-2000m [Himalaya, 9.V.61, Schmid].

*Ropica ghanaensis* Breuning, 1978d: 95.

2 ?PT: [Ghana, Tafo, II.1968, E.O. Boafo]; ?PT: [idem, mais 9.X.1967].

*Ropica postmaculata* Breuning, 1978d: 95.

?PT: [Ghana, Tafo, II.1968, E.O. Boafo].

*Rucentra smetanai* Hüdepohl, 1992: 179.

4 PT: Bornéo, Sabah, Mt Kinabalu N.P., east base St John's Pk, 4000m, 08.VI-II.1988, Smetana; 2 PT: idem, mais 3900m.

*Saperda gleneoides* Breuning, 1950b: 14.

2 ?PT: [Tonkin, Montes Maous, IV-V, 2-3000', H. Fruhstorfer].

*Saperda mandschukuoensis* Breuning, 1943: 104.

HT: ♂, Kharbine; ?PT: [Mandchuk □ □ □, Charbin].

*Saperda scalaris algeriensis* Breuning, 1952: 176. (Clerm. i. l.).

HT: ♀, Algerien, Yakouren [VI.29, Ou □ □ □]; ?PT: [Kabylie, Yakouren, VI.1902, Dr A. Chobaut].

*Saperda subscalaris* Breuning, 1952: 179.

HT: ♀, China, Provinz Yunnan, Fluss Soling-ho.

*Schoenionta ichneumonoides* Breuning, 1954a: 537.

?PT: [Cochinchine, Cap St Jacques, Baria].

*Schoenionta javanicola* Breuning, 1954a: 538.

HT: ♀, Java, Soekaboemi, Coll. Le Moul.

*Schoenionta merangensis* Breuning, 1954a: 539.

?PT: [Sumatra, Medan]; ?PT: [Sumatra, Merang].

*Schoenionta philippinica* Breuning, 1954a: 541.

HT: ♂, Philippinen, Insel Mindanao, Zamboanga, leg. Baker.

*Serixia assamana* Breuning, 1967a: 34.

HT: Assam, Cachar District, 9.V.1960, leg. Schmid [Bandarkhal, 500ft].

*Serixiomenesia flavosignata* Breuning, 1959a: 12.

?PT: [Malakka, Kouala Lumpur].

*Serixiophytoecia vitticollis* Breuning, 1950e: 380.

?PT: [Kuching, Jan. 04, J.H.]; ?PT: [Kuching, 16.IX.1899].

*Setoparmena mussardi* Breuning, 1971b: 305.

HT: Ceylan Central, au-dessus de Talatuoya, 27.I.1970, entre 850 et 1000m, tamisage de forêt [Mussard, Besuchet et Löbl]; PT: idem.

*Similosodus burckhardti* Hüdepohl, 1996: 4.

HT: ♂, Ost-Malaysia, Bornéo, Sabah, Sepilok, IV-V.82, leg. Burckhardt.

*Sophronica allardi* Breuning, 1974d: 777.

?PT: [Ht Zaïre, Kisangani].

*Sophronica ceylanica* Breuning, 1971b: 306.

HT: Ceylan, North central, Medawachchiya, 6.II.1970, à la lumière du Resthouse [Mussard, Besuchet et Löbl].

*Sophronica junodi* Breuning, 1950b: 12.

HT: Transvaal, Shilouvane, leg. Junod.

*Sophronica vittipennis* Breuning, 1986: 55.

PT: Botswana, Serowe, Swaneng Hill, 7.X.77, U.V.

*Spinogoephanes pauliani* Breuning, 1975: 263.

PT: Madagascar Centre, Adringitra Centre, plateau Andohariana (Soaindrana), 2000-2100m, HFAM 1, 9.XI-10.XII.1970.

*Spinomatidia similis* Breuning, 1981a: 46.

PT: Cape Province, King Williamstown, XII.1961, im Humus, N. Leleup.

*Stenellipsis albovittata* Breuning, 1978a: 26.

?PT: [New Caledonia, Nouméa, Mt. Koghi / 12-13.II.1977, leg. Dr J. Balogh].

*Stenellipsis assimilis* Breuning, 1978a: 29.

?PT: [New Caledonia, I. Lifou, Ejengen, 21.II.1977, leg. Dr J. Balogh].

*Stenellipsis basipustulata* Breuning, 1978a: 27.

?PT: [New Caledonia, Mt Mandjelia, 17.II.1977, leg. Dr J. Balogh].

*Stenellipsis fuscolateralis* Breuning, 1978a: 28.

?PT: [New Caledonia, I. des Pins, 23-27.II.1977, leg. Dr J. Balogh]; ?PT: [New Caledonie, I. Lifou, Chépénéhé, 20.II.1977, Dr J. Balogh].

*Stenellipsis kaszabi* Breuning, 1978a: 28.

?PT: [New Caledonia, Boursil, Col. D. Roussettes / 26-27.I.1977, leg. Dr J. Balogh].

*Stenellipsis obscurithorax* Breuning, 1978b: 69.

?PT: [New Caledonia, Mt Panié, 8.X.1977, leg. Dr J. Balogh].

*Stenellipsis postmaculata* Breuning, 1978a: 28.

?PT: [New Caledonia, I. des Pins, 23-27.II.1977, leg. Dr J. Balogh].

*Stenellipsis subunicolor* Breuning, 1978a: 27.

PT: New Caledonia, I. Lifou, Bjengen, 21.II.1977, leg. Dr J. Balogh.

*Stenostola brunnescens* Breuning, 1947c (1946): 144.

HT: ♂, Japon, île Hondo, Gifu.

*Stenostola callosicollis* Breuning, 1943: 100.

HT: Mandchourie, Handaohetzy [VI.1938]; ?PT: [idem].

*Stenostola trivittata* Breuning, 1947c (1946): 143.

HT: ♀, île de Hondo, Chiuzenji; ?PT: [Yunohana, Tateiwa V., Minami-Aizu, 14.VI.1949, Y.K. / North of Nikko, Honshi].

*Stenostola univittata* Breuning, 1947c (1946): 144.

HT: ♂, Hondo, Gifu; ?PT: [idem].

*Stibara nigrovittata* Breuning, 1954a: 467.

2 ?PT: [Burma].

*Sybra frasersi* Breuning, 1976b: 737.

HT: Malaisie, Frasers Hill, 17-30.XI.1974, leg. P. Pfanner.

*Sybra pfanneri* Breuning, 1976b: 737.

HT: Malaisie, Frasers Hill, 17-30.XI.1974, leg. P. Pfanner.

?HT: [Malaisie, Cameron Highlands, V.1975, P. Pfanner].

*Sybra postbasicristata* Breuning, 1974b: 371.

HT: Inde, Kerala, Cardamon Hills, entre Pambanar et Peermade, 950m, 5.XI.1972, leg. Besuchet, Löbl, Mussard.

*Sybrinus albomarmoratus* Breuning, 1978d: 107.

2 ?PT: [Ghana, Tafo, IX-X.1967, E.O. Boafo]; ?PT: [idem mais II.1968].

*Sybrinus flavicans* Breuning, 1978d: 107.

PT: Ghana, Tafo, E.O. Boafo, IV.1968; 2 ?PT: [idem]; ?PT: [idem mais IX-X.1967]; 8 ?PT: [idem mais II.1968]; ?PT: [idem mais VI.1968]; ?PT: [idem mais X.1968].

*Tetraulax junodi* Breuning, 1950b: 6.

HT: ♀, Transvaal, Shilouvane, leg. H. Junod; PT: idem.

*Thyestilla coerulea* Breuning, 1943: 100.

HT: ♀, Chine, province Sétchouen, Tatsienlou [Stötzner].

*Tmesisternus fergussoni* Breuning, 1970b: 478.

?PT: [Ile Fergusson, IX-XII.1924].

*Tmesisternus rosselli* Breuning, 1982: 20.

PT: Rossell I., I-III.98, Meek.

*Trichauxa albovittata descarpentriesi* Breuning, 1975: 262.

HT: Madagascar Centre, Adringitra Est, Anjavidilava, 1850-1950m, FDHM 2, 18.XII.1970-15.I.1971.

*Trichohyllisia mussardi* Breuning, 1957a: 835.

HT: Congo Belge, Uélé, I.1952, coll. Mussard [Bili, Verbeke].

*Trichopterolophia schurmanni* Breuning, 1980c: 49.

PT: ♂, Ile de Bali, Bedugul, XII.1979, leg. Schurmann, coll. Schurmann; PT: idem mais I.80.

*Tricondyloides parinermis* Breuning, 1978a: 25.

PT: Nlle Calédonie, Mt Rembai, 19-21.I.1977, leg. Dr J. Balogh.

*Tuberculetaxalus lumawigi* Breuning, 1980e: 163.

?PT: [Insel Mindanao].

*Zosne matangensis* Breuning, 1950e: 378.

?PT: [Bornéo, Matang]; ?PT: [Matang, 3600ft].

## LISTE 2: NOMS DU NIVEAU INFRA-SUBSPÉCIFIQUE DISPONIBLES

*Nitocris nigrocincta* Aurivillius var. *opaca* Aurivillius, 1907: 38.

2 ST (CT): Deutsch Ost-Africa, Kigonsera [1906].

*Oberea consentanea* Pascoe var. *unicolor* Breuning, 1956f: 236.

?PT: [Fu Kien, Fochow]; ?PT: [Tonkin, Hoa-Binh].

*Oberea euphorbiae* Germar var. *intermedia* Breuning, 1947e: 59.

HT: ♀, Hongrie, Uzghorod [Art. Vavra]; ?PT: [So Sur Sur, Fritsch].

*Oberea formosana* Pic var. *ruficornis* Breuning, 1956f: 235.

?PT: [Chekiang, Tienmuschan].

*Phytoecia gaubili* Mulsant var. *separata* Pic, 1895: 70.

?PT: [Teniet, Alg.].

## LISTE 3: NOMS DU NIVEAU INFRA-SUBSPÉCIFIQUE NON DISPONIBLES

- Agelasta mindanaonis* Breuning m. *albescens* Breuning, 1980e: 158.  
2 ?PT: [Insel Mindanao].
- Agelasta mindanaonis* Breuning m. *nigerrima* Breuning, 1980e: 158.  
?PT: [Insel Mindanao].
- Blepisanis coerulea* Aurivillius m. *viridipennis* Breuning, 1950b: 20.  
HT: ♀, Congo belge, Elisabethville [XI.1911]; ?PT: [Kenya, Ikutha]; ?PT: [Vihl. Nyansa].
- Blepisanis exilis* Pascoe m. *ochreovittata* Breuning, 1950b: 21.  
HT: ♀, Transvaal, Makanete, leg. H. Junod [Ricatlá]; ?PT: [Transval, Lichtenburg, XI.1903]; ?PT: [Salisbury, O'Neil, 13.II.1914].
- Blepisanis flavovittata* Breuning m. *albovittata* Breuning, 1950c: 24.  
?PT: [Congo, Elisabethville].
- Blepisanis insignis* Aurivillius m. *lateriflava* Breuning, 1950c: 20.  
2 ?PT: [Belg. Kongo, Elisabethville].
- Blepisanis neavei* Aurivillius m. *aurosternalis* Breuning, 1950c: 20.  
?PT: [Congo, Elisabethville]; ?PT: [E'ville, XI.1911].
- Blepisanis neavei* Aurivillius m. *rufosternalis* Breuning, 1950b: 20.  
2 ?PT: [Kenya, Ikutha].
- Cleptometopus mnischevi* Lacordaire m. *rufovittatus* Breuning, 1966a: 109.  
HT: Nord-Ost-Assam, 3.VII, leg. Schmidt, coll. Mussard [Nakhu].
- Chlorisanis viridis* Pascoe m. *violaceosuturalis* Breuning, 1954a: 454.  
?PT: [Tenasserim, Tandong, 4000', V., Fruhstorfer leg.].
- Conizonia compacta* Ménétriés m. *discovittata* Breuning, 1947e: 59.  
HT: Arménie, Ordubad; ?PT: [Arménie, Ordubad].
- Conizonia warnieri* Lucas m. *brunnea* Breuning, 1954a: 495.  
HT: ♀, Oran, Magenta [M. Rotrou, 1915]; ?PT: [Oran, Magenta].
- Conizonia warnieri* Lucas m. *ruficornis* Breuning, 1954a: 495.  
HT: ♂, Oran, Magenta.
- Dirphya nigricornis* Olivier m. *pseudonigricornis* Breuning, 1950b: 23.  
HT: ♀, Transvaal, Shilouvane, leg. H. Junod.
- Dorcadion emgei* Ganglbauer m. *multivittatum* Breuning, 1947b (1946): 104.  
HT: ♀, Grèce, Kyllène.
- Dorcadion tibiale* Jakovlev m. *accessorium* Breuning, 1947d (1946): 166.  
HT: ♂, Turkestan, Vallée du Naryn.
- Dorcadion subsericatum* Pic m. *junctum* Breuning, 1962c: 370.  
2 PT: Anatolie, Kastamuni, leg. Breuning [27.IV.59].
- Dorcadion veluchense* Pic m. *peristericum* Breuning, 1947b (1946): 106.  
?PT: [Peristeri, Pindos]; ?PT: [Peristeri].



- Entelopes glauca* Guérin m. *nigroreducta* Breuning, 1954a: 477.  
?PT: [Borneo, Setipas]; ?PT: [id, mais Bornéo occ.].
- Glenea diverselineata* Pic m. *yunnana* Breuning, 1976b: 740.  
HT: Chine, Prov. Yunnan, Tche-Ping-Tcheou.
- Glenea luctuosa* Pascoe m. *rufoabdominalis* Breuning, 1956b: 183.  
?HT: Bougainville, BMNH [Bougainv.].
- Gnathoenia congoana* Belon m. *immaculipennis* Breuning, 1966c: 16.  
HT: ♀, Congo belge, Befori, coll. Mussard [équateur, XII.51].
- Gnathoenia congoana* Belon m. *reticulata* Breuning, 1937: 238.  
?PT: [Congo, Stanleyville].
- Hyllisia leucosuturata* Hunt & Breuning m. *multialbovittata* Breuning, 1981a: 44.  
?PT: [Transval, Kruger Park].
- Linda annulicornis* Matsushita m. *ruficeps* Breuning, 1954a: 553.  
HT: ♀, China, Provinz Yunnan, Yunnanfu [Kouy-tchiou].
- Linda apicalis* Pic m. *yunnana* Breuning, 1976b: 741.  
HT: Chine, Prov. Yunnan, Talifu.
- Linda femorata* Chevrolat m. *rufifrons* Breuning, 1954a: 549.  
HT: ♀, China, Provinz Kweichow, Nanning.
- Linda gracilicornis* Pic m. *rufofemorata* Breuning, 1954a: 550.  
HT: ♂, China, Provinz Szetschuan, Tatsienlu, ex coll. Reitter.
- Linda gracilicornis* Pic m. *tatsienlui* Breuning, 1954a: 550.  
HT: ♀, China, Provinz Szetschuan, Tatsienlu, ex coll. Reitter; ?PT: [Tatsienlu, Szetschuan].
- Linda nigroscutata* Fairmaire m. *conjuncta* Breuning, 1954a: 558.  
2 ?PT: [Yunnan, Yunnan sea].
- Linda nigroscutata* Fairmaire m. *longeplagiata* Breuning, 1954a: 558.  
HT: ♂, China, Provinz Yunnan, Fluss Solingho, ex coll. Hauser; ?PT: [Kuatun, 2500m, 27. 40n. Br., 117.408 L., J. Klapperich, 31.V.1938, Vukien].
- Linda rubescens* Hope m. *unicolor* Breuning, 1954a: 556.  
HT: ♂, Sikkim, Gnatong.
- Linda vitalisi* Vuillet m. *nigroreducta* Breuning, 1954a: 561.  
2 ?PT: [Tonkin, Chapa].
- Loboberea pygidialis* Gahan m. *javaensis* Breuning, 1954a: 533.  
?HT: Java, Preanger, ZMAN [W. Java, Sukabumi, 2000 ft, H. Fruhstorfer];  
?PT: [Java occident., Sukabumi, 2000', 1893, H. Fruhstorfer].
- Loboberea pygidialis* Gahan m. *nigroreducta* (*nigroreducta* orthographe originale incorrecte) Breuning, 1954a: 533.  
HT: ♂, Sumatra, Palembang.
- Loboberea pygidialis* Gahan m. *trimaculata* Breuning, 1950a: 200.  
?PT: [Java, Gounod gedeh]; ?PT: [Sumatra, Palembang].

- Mecas laminata* m. *discopunctata* Breuning, 1955c: 150.  
2 ?PT: [Mexico, Cordova].
- Mecas laminata* m. *rufobasalis* Breuning, 1955c: 150.  
?PT: [Mexico, Cordova]; ?PT: [Mexique].
- Mecas laticeps* m. *mediopunctata* Breuning, 1955c: 151.  
?PT: [N. Yucatan, Temax, Gaumer].
- Mecas laticeps* m. *sutureflava* Breuning, 1955c: 151.  
2 ?PT: [N. Yucatan, Temax, Gaumer].
- Mecas rotundicollis* m. *mediomaculata* Breuning, 1955c: 149.  
?PT: [Mexico, ill., Tehnucax □ □ □].
- Mecas rubripes* m. *callosoreducta* Breuning, 1955c: 143.  
?PT: [Mexico].
- Menesia bimaculata* Breuning m. *latevitticollis* Breuning, 1954a: 424.  
2 ?PT: [Borneo].
- Menesia bimaculata* Breuning m. *prolongatevittata* Breuning, 1954a: 424.  
?PT: [Borneo, Sandakan, Baker].
- Menesia nigriceps* Aurivillius m. *inhumeralis* Breuning, 1954a: 422.  
HT: ♀, Borneo, Sandakan, leg. Baker; ?PT: [Malacca / Staudinger].
- Menesia sulphurata* Gebler m. *gifuensis* Breuning, 1954a: 410.  
HT: ♀, Japan, Insel Gifu, Hondo, Provinz Amagodani, 13.VIII.1947, leg. Kohbayashi.
- Menesida flavipennis* Breuning m. *basiflava* Breuning, 1954a: 446.  
?PT: [Sumatra, Medan].
- Menesida flavipennis* Breuning m. *mediofusca* Breuning, 1954a: 446.  
2 ?PT: [Sumatra, Medan].
- Nitocris schoutedeni* Breuning m. *verbekei* Breuning, 1957b: 206.  
HT: ♂, Congo Belge, Uele, coll. Mussard [Bili, 1952, Verbeke].
- Nupserha ugandensis* Breuning m. *nigrolateralis* Breuning, 1978d: 112.  
?PT: [Uganda, Entebbe, II-VII.1972, Exp. H. Falke].
- Oberea angolensis* Breuning var. *bimaculaticeps* Breuning, 1961b: 62.  
HT: ♂, Angola, Bailundo.
- Oberea angolensis* Breuning var. *nigritomaculata* Breuning, 1961b: 62.  
HT: ♀, North West Rhodesia.
- Oberea annulicornis* Pascoe var. *craengiana* Breuning, 1961b: 120.  
?HT: ♀, Celebes, Bonthain, leg. Ribbe, MNHN [S.Celebes, Bua-Kraeng, 5000', II.1896, H. Fruhstorfer]; ?PT: [S.Celebes, Lompa-Battau, 3000ft, III.96, H. Fruhstorfer].
- Oberea annulicornis* Pascoe var. *umbrosior* Breuning, 1961b: 120.  
?PT: [Celebes, Tamboegoe].
- Oberea artocarpis* Gardner m. *trifusciventris* Breuning, 1962a: 147.  
2 ?PT: [Inseln Andamanen].

- Oberea atricilla* Fairmaire m. *apicenigrescens* Breuning, 1950c: 41.  
?PT: [Kamerun, Mt Bronje-Farm]; ?PT: [Cameroons, Bitye-Ja River, 3000 feet].
- Oberea atricilla* Fairmaire var. *asmarensis* Breuning, 1961b: 82.  
HT: ♂, Erythrée, Asmara [VIII].
- Oberea atricilla* Fairmaire var. *bimaculiventris* Breuning, 1961b: 82.  
HT: ♀, Cameroun, Ja River [Bitye Ja River].
- Oberea atricilla* Fairmaire m. *parteruficeps* Breuning, 1950c: 41.  
?PT: [Congo français, N'Djolé, J. Arrighi]; ?PT: [Cameroons, Bitye Ja River, 3000 ft].
- Oberea atricilla* Fairmaire m. *rufopygidialis* Breuning, 1950c: 41.  
?PT: [Cameroons, Bitye-Ja River, 3000 feet]; ?PT: [Kenya, Ikutha].
- Oberea basalis* Chevrolat m. *flavicans* Breuning, 1950c: 42.  
?PT: [Gabon]; ?PT: [Gabon, Bas Ozooné, Favarel].
- Oberea bicoloricornis* Pic var. *rubroantennalis* Breuning, 1962a: 186.  
HT: ♀, Chine, province Szetschuan, Tatsienlu [Reitter].
- Oberea cingulata* Aurivillius m. *parteflavosternalis* Breuning, 1964a: 102.  
HT: Uganda [Afr. c., coll. Plason].
- Oberea consentanea* Pascoe m. *mausoni* Breuning, 1950d: 274.  
2 ?PT: [Tonkin, Montes Mauson, IV-V, 2000', H. Fruhstorfer].
- Oberea curialis* Pascoe m. *nigroscapus* Breuning, 1950b: 25.  
?PT: [Java Orient., Mt Ardjoeno]; ?PT: [L'Ile de Ceram, V.M. Duchon].
- Oberea davaoensis* Breuning var. *antenigrocollis* Breuning, 1961b: 139.  
PT: Ile Mindanao, Davao; ?PT: [idem].
- Oberea depressa* Gebler m. *infradepressa* Breuning, 1967b: 40.  
HT: ♂, Mandchourie, Ile Askold [M. Jackowskie, 1880]; PT: idem [42,5° lat. N, 102° long., 1878].
- Oberea depressa* Gebler var. *subdepressa* Breuning, 1962a: 215.  
HT: ♀, Chine, prov. Kiangi-si, Kiu-kiang.
- Oberea discoidalis* Jordan var. *maculisternalis* Breuning, 1961b: 86.  
HT: ♂, Cameroun, Ja River [3000 feet].
- Oberea erythrocephala* Schrank m. *macedonica* Breuning, 1947e: 58.  
HT: ♀, Macédoine, Usküb [2.6.68]; ?PT: [Bulgarie, Stanimaka, VII.33, Pfeiffer].
- Oberea erythrostoma* Heller var. *antenigrescens* Breuning, 1961b: 135.  
HT: ♀, Ile Samar [VI-VII.96, J. Whithead].
- Oberea erythrostoma* Heller var. *banahoana* Breuning, 1961b: 135.  
HT: ♀, Ile Luzon, Mt Bañahao; PT: Insel Luzon, Laguna.
- Oberea erythrostoma* Heller var. *cebuensis* Breuning, 1961b: 134.  
HT: ♂, Philippines, Ile Cebu; PT: idem.
- Oberea erythrostoma* Heller var. *medionigricollis* Breuning, 1961b: 135.  
HT: ♂, Ile Luzon.
- Oberea erythrostoma* Heller var. *melanothorax* Breuning, 1961b: 135.  
HT: ♀, Ile Luzon, Mt Isorong; PT: idem.
- Oberea erythrostoma* Heller var. *partenigripes* Breuning, 1961b: 136.  
HT: ♂, Ile Luzon, Albay [Whithead, 94].

- Oberea erythrostoma* Heller var. *pseudomakilingi* Breuning, 1961b: 135.  
?PT: [Mindoro]; ?PT: [Philipp.].
- Oberea erythrostoma* Heller var. *ruficuspis* Breuning, 1961b: 135.  
HT: ♂, Ile Luzon, Laguna.
- Oberea erythrostoma* Heller var. *samarana* Breuning, 1961b: 135.  
HT: ♀, Ile Samar [VI-VII.96, J. Whithead].
- Oberea erythrostoma* Heller var. *samarensis* Breuning, 1961b: 135.  
HT: ♀, Ile Samar [VI-VII.96, J. Whithead].
- Oberea formosana* Pic var. *spinipennis* Breuning, 1962a: 163.  
?PT: [S.E. Borneo].
- Oberea fuscicollis* Breuning var. *fuscolateralis* Breuning, 1961b: 138.  
HT: ♂, Ile Luzon, Cap Engano [Whitehead leg.].
- Oberea fuscicollis* Breuning var. *infrarufescens* Breuning, 1961b: 138.  
?PT: [Philippinen, Mindanao, Surigao].
- Oberea fuscicollis* Breuning var. *mindanaonis* Breuning, 1961b: 139.  
HT: ♂, Ile Mindanao; ?PT: [Luzon, mt B □ □ □].
- Oberea griseopennis* Schwarzer var. *basimaculata* Breuning, 1962a: 219.  
HT: ♂, Formosa, Sozan [30.IV.1933, Col. M. Chujo]; ?PT: [S. Formosa, Alikang, VI.09, Sauter S. V.].
- Oberea herzi* Ganglbauer var. *longevittata* (Pic i.l.) Breuning, 1962a: 205.  
HT: ♀, Corée, Pu Ryöng; ?PT: [Korea, Pu Ryong].
- Oberea herzi* Ganglbauer var. *mediomaculata* Breuning, 1962a: 205.  
HT: ♂, Mandchourie, Handaohstzy.
- Oberea herzi* Ganglbauer var. *rufipennis* Breuning, 1962a: 205.  
HT: ♂, Chine, Nanking.
- Oberea humeralis* Gressitt var. *fruhstorferi* Breuning, 1962a: 180.  
HT: ♀, Tonkin, Mts Mauson, 700-1000m, IV-V, leg. Fruhstorfer.
- Oberea humilis* Fairmaire var. *togoensis* Breuning, 1961b: 78.  
PT: Togo, Bismarckburg, leg. Conradt.
- Oberea humilis* Fairmaire m. *pseudohumilis* Breuning, 1950c: 42.  
?PT: [Kamerun, Bitye River].
- Oberea inclusa* Pascoe var. *partenigrescens* Breuning, 1962a: 203.  
HT: ♂, Corée, Pu Ryong.
- Oberea insperans* Pascoe m. *celebesiana* Breuning, 1950a: 199.  
?PT: [Celebes, Makassar].
- Oberea japonica* Thunberg m. *infranigrescens* Breuning, 1947e: 58.  
HT: ♀, Japon, Omi [Centr. Japan, Omi, Zeze, VI.96, T. Lenz v., 12.IX.96]; ?PT: [Japon, Kioto, Villion].
- Oberea lacana* Pic m. *mediofuscofemoralis* Breuning, 1967b: 40.  
HT: ♀, Cambodge.
- Oberea lacana* Pic var. *orientalis* Breuning, 1961b: 95.  
HT: ♂, Tonkin, Hoabinh; ?PT: [Tonkin occ., Rég. de Hoa Binh].
- Oberea laetifica* Pascoe var. *toliensis* Breuning, 1961b: 122.  
HT: ♂, Célèbes, Toli-Toli; ?PT: [N. Celebes, Toli-Toli, Fruhstorfer].

- Oberea lateapicalis* Pic var. *rufobasalis* Breuning, 1962a: 151.  
HT: ♂, Inde, Anamalai Hills.
- Oberea lepesmei* Breuning, var. *haemorrhoidalis* Breuning, 1961b: 91.  
?PT: [Togo, Bismarckburg].
- Oberea longissima* Aurivillius var. *basirufa* Breuning, 1961b: 91.  
?PT: [Cameroons, Bitye-Ja River]; ?PT: [Côte d'Ivoire, Adiopodoumé, V.32, J. Lepesme].
- Oberea luluensis* Breuning, var. *atricollis* Breuning, 1961b: 88.  
HT: ♂, Cameroun, Mukonje Farm; ?PT: [Belg. Congo, Yungumbi, Fraser].
- Oberea lutea* Thunberg var. *nigroapicalis* Breuning, 1962a: 154.  
?PT: [Maissour, Shiroga]; ?PT: [Darjoeling, Mus. Vaekenfurg].
- Oberea macilenta* Newman var. *anterubripes* Breuning, 1961b: 140.  
?PT: [Philippis]; ?PT: pas d'étiquette de localité.
- Oberea melanostoma* Heller var. *melas* Breuning, 1961b: 136.  
HT: ♀, Ile Luzon, Mt Isorog; ?PT: [Philippis].
- Oberea melanostoma* Heller var. *rufinithorax* Breuning, 1961b: 136.  
?HT: [Pancan N □ □ □]; ?PT: [Ambulanga].
- Oberea mimetica* Heller var. *boholensis* Breuning, 1962a: 146.  
HT: ♀, Philippines, Ile Bohol; ?PT: [Luzon / Mt Banahao, IV.1914, Boettcher].
- Oberea mimetica* Heller var. *pseudomimetica* Breuning, 1962a: 145.  
HT: ♀, Philippines.
- Oberea mimetica* Heller var. *submimetica* Breuning, 1962a: 145.  
?PT: [Luzon, Mt Banahao].
- Oberea montivagans* Fisher var. *rubroscapus* Breuning, 1962a: 158.  
HT: ♀, Java, Pranger; ?PT: [Java].
- Oberea neavei* Aurivillius var. *antennalis* Breuning, 1961b: 75.  
?PT: [C. Belge, ill.].
- Oberea nefasta* Pascoe var. *atroampliata* Breuning, 1961b: 129.  
HT: ♀, Nouvelle Guinée, Geelwinck Bay, leg. Doherty.
- Oberea nefasta* Pascoe var. *flavoabdominalis* Breuning, 1961b: 129.  
HT: ♂, Nouvelle Guinée, Andai, leg. Doherty; ?PT: [Fergusson I., IX-XII.94, A.S. Meek].
- Oberea nefasta* Pascoe var. *rufuloides* Breuning, 1961b: 129.  
HT: ♂, Ile Roon près Nouvelle Guinée; ?PT: [N. Guineen, Warao].
- Oberea neptis* Pascoe var. *plurimaculiventris* Breuning, 1962a: 161.  
?PT: [Sumatra's O.K., Brästagi, 1300m, 6.IV.1918, J.B. Corporaal].
- Oberea nigerrima* Breuning m. *anterufofemoralis* Breuning, 1964b: 6.  
HT: ♂, Java, Batavia.
- Oberea nigerrima* Breuning var. *discovittata* Breuning, 1961b: 100.  
HT: ♂, Java; PT: Java, Soekaboemi.
- Oberea nigerrima* Breuning var. *rubricollis* Breuning, 1961b: 100.  
HT: ♀, Java, Soekaboemi.
- Oberea nigrocincta* Aurivillius m. *camerunensis* Breuning, 1964b: 6.  
HT: ♂, Cameroun, Kriby.

- Oberea nigriceps* White m. *flavipennis* Breuning, 1950a: 199.  
?PT: [Formosa, Kosempo, Coll. Sauter]; ?PT: [China, Hong-Kong].
- Oberea nigriceps* White var. *nigromaculicollis* Breuning, 1962a: 183.  
HT: ♂, Chine, Ngan hwei.
- Oberea nigriceps* White m. *obscuripennis* Breuning, 1967b: 40.  
HT: ♂, Tonkin, Monts Mauson, V-VI, 700-1000m alt., leg. H. Fruhstorfer [IV-V, 2-3000'].
- Oberea nigripennis* Breuning m. *rufiniscapus* Breuning, 1950c: 38.  
?PT: [Gabon, Bas Ozooné].
- Oberea nigriventris* Bates var. *postrufofemoralis* Breuning, 1961b: 94.  
HT: ♂, Chine, Prov. Fokien, Foochow.
- Oberea notata* Pic var. *rufoantennata* Breuning, 1962a: 196.  
HT: ♂, Chine, prov. Chekiang, Kiukiang; ?PT: [Chekiang, Kiu Kiang].
- Oberea nyassana* Breuning m. *kenyensis* Breuning, 1955a: 76 ou Breuning, 1958a: 37.  
?PT: [Kenya, Ikutha].
- Oberea nyassana* Breuning var. *laterinigra* Breuning, 1961b: 74.  
?PT: [Mozambique, Zambesie].
- Oberea occidentalis* Lpesme & Breuning var. *apicenigra* Breuning, 1961b: 89.  
HT: ♀, Sierra Leone, Moyamba.
- Oberea pedemontana* Chevrolat m. *subtestacea* Breuning, 1947e: 58.  
HT: ♂, Tyrol, Rovereto; ?PT: [Tirol, Rovereto].
- Oberea pictipes* Pascoe m. *nigrofemorata* Breuning, 1956g: 23.  
?HT: Java, ISNB [Java]; ?PT: [Java, Mlle Badollet, 623-29].
- Oberea pictipes* Pascoe var. *rubripes* Breuning, 1961b: 108.  
HT: ♂, Bornéo.
- Oberea pictipes* Pascoe var. *tenasserimensis* Breuning, 1961b: 108.  
2 ?PT: [Malacca, Perak].
- Oberea posticata* Gahan var. *rubroantennata* Breuning, 1962a: 165.  
HT: ♂, Assam, Suriga.
- Oberea praedita* Pascoe var. *antenigripes* Breuning, 1961b: 116.  
?PT: [Borneo, Pontianak].
- Oberea pseudopascoei* Breuning m. *propinqua* Breuning, 1950c: 41.  
2 ?PT: [Gabon, Bas Ozooné].
- Oberea pseudovaricornis* Hunt & Breuning m. *fuscoampliata* Breuning, 1978d: 115.  
3 ?PT: [Prov. du Cap, Port St-John, II.1963, leg. G. Heinrich].
- Oberea pseudovaricornis* Hunt et Breuning var. *mossambicensis* Breuning, 1961b: 73.  
HT: ♂, Mossambique, Zambezi.
- Oberea puncticollis* Breuning var. *crassepuncticollis* Breuning, 1962a: 146.  
HT: ♂, Ile Luzon, prov. Tayabas, Infante; ?PT: [Philippines, Luzon, Prov. Laguna].
- Oberea pupillata* Gyllenhal m. *bimaculatoides* Breuning, 1947e: 58.  
HT: ♂, Moravie, Prostějov; ?PT: [Skuje, Vlach.].
- Oberea pupillata* Gyllenhal m. *pseudodepressa* Breuning, 1947e: 58.  
HT: ♂, Sibérie, Krasnojarsk; ?PT: [Sibir., Irtysch].

- Oberea quianga* Heller var. *partefuscollicis* Breuning, 1961b: 137.  
HT: ♂, Ile Cebu.
- Oberea reimschi* Breuning var. *merangana* Breuning, 1961b: 105.  
?HT: Sumatra, Merang, coll. Breuning [Sumatra, Medan].
- Oberea rubetra* Pascoe var. *basinigricollis* Breuning, 1961b: 113.  
HT: ♂, Bornéo.
- Oberea rubetra* Pascoe var. *mediorufinipes* Breuning, 1961b: 113.  
?PT: [Sumatra, Medan]; ?PT: [Sumatra occident.].
- Oberea rubetra* Pascoe var. *parterufipes* Breuning, 1961b: 113.  
HT: ♀, Bornéo, Sandakan, leg. Baker; ?PT: [Borneo, Sandakan, Baker].
- Oberea ruficollis* Fabricius var. *rufolineata* Breuning, 1962a: 227.  
HT: ♀, Floride, Stanford [V et VI.95].
- Oberea sansibarica* Harold var. *binigromaculata* Breuning, 1961b: 63.  
HT: ♂, Kenya, Maguga [6.III.54].
- Oberea schaumii* Le Conte var. *infrarufa* Breuning, 1962a: 223.  
HT: ♂, Californie, Mariposa [VI.74]; ?PT: [U.S., California].
- Oberea schaumii* Le Conte var. *vittipennis* Breuning, 1962a: 224.  
2 ?PT: [U.S., Ohio].
- Oberea scutellaroides* Breuning m. *rufithorax* Breuning, 1947e: 58.  
HT: ♂, Chine, province Tchékiang, Tschenkiang [2.VI.18]; ?PT [China].
- Oberea seminigra* Chevrolat m. *clareabdominalis* Breuning, 1956d: 700.  
?PT: [Philipp., Semp □ □ □]; ?PT: [Philippines, Luzon, Bilucao, La Laguna].
- Oberea sobrina* Boisduval var. *basifuscoabdominalis* Breuning, 1961b: 127.  
?PT: [Insel Ceram].
- Oberea subabdominalis* Breuning var. *momeitensis* Breuning, 1962a: 167.  
HT: ♂, Birmanie, Momeit [Hte Birmanie, Etat de Momeit, 600m].
- Oberea suturalis* Jordan var. *flaveola* Breuning, 1961b: 79.  
?PT: [Kamerun, Mukonje Farm]; ?PT: [Ogowe].
- Oberea taihokuensis* Breuning var. *flavosternalis* Breuning, 1962a: 169.  
HT: ♂, Formose, Kosempo; ?PT : [ill., Kurau].
- Oberea tricolor* Aurivillius var. *binaluanica* Breuning, 1961b: 112.  
?PT: [Kinabalu].
- Oberea tricolor* Aurivillius var. *discoclarior* Breuning, 1961b: 112.  
HT: ♂, Ile de Bali, III-IV.1896, leg. Doherty.
- Oberea trigonifera* Aurivillius m. *maculiventralis* Breuning, 1958a: 37.  
?PT: [Kap Colony, East London]; ?PT: [ill., Peramiha, 1905].
- Oberea tripunctata* Swedenbord var. *subdeficiens* Breuning, 1962a: 229.  
HT: ♂, New York.
- Oberea tripunctata* Swedenbord var. *subexilis* Breuning, 1962a: 228.  
HT: ♀, Canada, Montréal [Que., VI.].
- Oberea tripunctata* Swedenbord var. *submandarina* Breuning, 1962a: 229.  
HT: ♀, Missouri.
- Oberea unimaculicollis* Breuning var. *nigroampliata* Breuning, 1962a: 194.  
HT: ♀, Sumatra, Medan.

- Oberea varicornis* Fåhraeus m. *laterinigrescens* Breuning, 1950c: 41.  
?PT: [Delazoa, Bai.]; ?PT: [Mozambique, Zambezi].
- Oberea viperina* Pascoe var. *burmanensis* Breuning, 1961b: 104.  
?PT: [Burma].
- Oberea viperina* Pascoe var. *clariventris* Breuning, 1961b: 103.  
HT: ♂, presqu'île de Malacca, Perak, Gounong-Boubou, leg. Doherty [1100m].
- Oberea viperina* Pascoe var. *penangensis* Breuning, 1961b: 104.  
PT: Malacca, Perak, Doherty.
- Oberea viperina* Pascoe var. *transitiva* Breuning, 1961b: 103.  
HT: ♂, Ile Engano.
- Oberea walkeri* Gahan var. *sikkimensis* Breuning, 1961b: 185.  
HT: ♂, Sikkim, Darjeeling, leg. Andrewes.
- Oberea yunnanensis* Breuning var. *atripennis* Breuning, 1961b: 98.  
HT: ♂, Chine, province Yunnan, Solingho.
- Obereopsis sericea* Gahan m. *subluteonigra* Breuning, 1966c: 16.  
HT: ♂, Manipur, Poi, 1200m, 4.VII.1960, coll. Mussard [Assam].
- Obereopsis verticenigra* Breuning f. *flavoabdominalis* Breuning, 1974b: 374  
(*flvoaabdominalis* orthographe originale incorrecte).  
HT: Inde, Kerala, Trivandrum Dt., Poonmudi Range, 950m, V.1972, leg. T.R.S. Nathan.
- Ossonis clytomima* Pascoe m. *flavotibialis* Breuning, 1954a: 430.  
HT: ♂, Borneo, Sandakan, leg. Baker.
- Paradystus notator* Pascoe m. *fuscoampliat* Breuning, 1954a: 459.  
HT: Soekaranda, I.1894, Dohrn; ?PT: [Medan, Mjööb].
- Paradystus notator* Pascoe m. *sericeoprolongatus* Breuning, 1954a: 459.  
?PT: [Borneo, Sandakan, Baker]; ?PT: [ill., Lawas, II-III.96, A. Everett].
- Paraglenea fortunei* Saunders m. *clarevittata* Breuning, 1952: 126.  
HT: ♀, China, Insel Chusan.
- Paraglenea fortunei* Saunders m. *conjunctefasciata* Breuning, 1952: 126.  
HT: ♂, China, Provinz Szetschuan, Tatsienlu.
- Paraglenea fortunei* Saunders m. *unicoloripennis* Breuning, 1952: 127.  
HT: ♂, China, Insel Chusan; ?PT: [idem].
- Paraglenea fortunei* Saunders m. *viridicollis* Breuning, 1952: 125.  
HT: ♂, China, Provinz Hupe, Ichang; ?PT: [idem].
- Pardaloberea curviticeps* Pic m. *partenigrescens* Breuning, 1954a: 534.  
?PT: [Tonkin, Hoa-Binh].
- Phytoecia algerica* Desbrochers des Loges m. *nigroanal* Breuning, 1947e: 59.  
HT: Algérie; ?PT: [Oran].
- Phytoecia analis* Fabricius m. *rufescens* Breuning, 1951: 443.  
2 ?PT: [Côte d'Ivoire, Dimbokro].



- Phytoecia aurivillii* Breuning m. *violaceipennis* Breuning, 1951: 410.  
HT: ♀, Angola, Bailundo; ?PT: [Kenya, Ikitha].
- Phytoecia balcanica* Frivaldszky m. *subvitticollis* Breuning, 1951: 92.  
HT: ♂, Anatolie, Amasia, leg. Korb [1888]; ?PT: [Balkan].
- Phytoecia bodemeyeri* Reitter m. *luristanica* Breuning, 1947e: 59.  
HT: ♂, Louristan [Persia]; ?PT: [Persia, Luristan].
- Phytoecia bodemeyeri* Reitter m. *rufofemorata* Breuning, 1947e: 59.  
HT: ♀, Louristan [Persien, v. Bodemeyer].
- Phytoecia coerulescens* Scopoli m. *marthae* Breuning, 1951: 100.  
HT: ♀, Catalogne, San Feliù de Guixols, 18.V.1950; ?PT: [Colline Morières, 28.V.1908].
- Phytoecia collaris* Pascoe m. *bulbosa* Breuning, 1951: 414.  
?PT: [P. Natal / M. Germ.].
- Phytoecia comes* Bates m. *griseopubescens* Breuning, 1951: 96.  
HT: ♂, Ile Hondo, Chiuzenji; ?PT: [Hondo, Chiuzenji].
- Phytoecia comes* Bates m. *ohbayashii* Heyrovsky, 1952: 13.  
?PT: [Oomor-Jap., coll. Dr Heyrovsky].
- Phytoecia delagrangei* Pic m. *subgrisea* Breuning, 1951: 354.  
HT: ♂, Marasch [V.28, Taurus, leg. H. Kulzer]; ?PT: [Marasch, V.28, Taurus, leg. H. Kulzer].
- Phytoecia erivanica* Reitter m. *rufipennis* Breuning, 1947e: 59.  
HT: ♂, Transcaucasie, Suchoj-Fontan [1910, H. Kulzer]; ?PT: [Suchoj Fontan, 1910, H. Kulzer].
- Phytoecia erythaca* Pascoe m. *nigritipennis* Breuning, 1951: 412.  
?PT: [Zulu, Caffraria].
- Phytoecia erythaca* Pascoe m. *parteruficeps* Breuning, 1951: 412.  
HT: ♂, Zululand [Zulu, Caffraria].
- Phytoecia exilis* Pascoe m. *vittulipennis* Breuning, 1951: 422.  
HT: ♀, Transvaal.
- Phytoecia ferrugata* Ganglbauer ab. *houskai*, Heyrovsky, 1948: 20.  
PT: Palestine, Jerusalem, Houska leg.
- Phytoecia fervida* Pascoe m. *nigriceps* Breuning, 1951: 418.  
?PT: [Natal].
- Phytoecia fervida* Pascoe m. *nigrodiscahis* Breuning, 1951: 418.  
?PT: [ill., Maloen, 61 □ □ □ 99, JP Ce..].
- Phytoecia fervida* Pascoe m. *rufinitibialis* Breuning, 1951: 418.  
?PT: [Natal].
- Phytoecia flavovittata* Breuning m. *latevittipennis* Breuning, 1964b: 7.  
HT: ♀, Congo, Elisabethville.
- Phytoecia flavovittata* Breuning m. *latevitticollis* Breuning, 1951: 424.  
2 ?PT: [Mozambique, Zambesi].
- Phytoecia geniculata* Kolbe m. *flaviventris* Breuning, 1950c: 44.  
?PT: [Belg. Kongo, Beni].
- Phytoecia geniculata* Kolbe m. *fuscibasicornis* Breuning, 1950b: 31.  
?PT: [Côte d'Ivoire, Dimbokro]; ?PT: [Niger, Ogruga].

- Phytoecia geniculata* Kolbe m. *pusilla* Breuning, 1950b: 31.  
?PT: [Côte d'Ivoire, Dimbokro]; ?PT : [Togo].
- Phytoecia geniculata* Kolbe m. *subternigra* Breuning, 1950c: 44.  
2 ?PT: [Côte d'Ivoire, Dimbokro].
- Phytoecia haroldii* Fähræus m. *atricornis* Breuning, 1951: 453.  
2 ?PT: [Kenya, Ikuta].
- Phytoecia haroldii* Fähræus m. *bipunctulicollis* Breuning, 1951: 454.  
HT: ♂, Tanganyica, Lindi [D. O. Afr.].
- Phytoecia haroldii* Fähræus m. *holatripes* Breuning, 1951: 453.  
HT: ♀, Tanganyica, Lindi [Teir].
- Phytoecia haroldii* Fähræus m. *ornaticollis* Breuning, 1950c: 46.  
?PT: [Kenya, Nairobi, 1660m].
- Phytoecia haroldii* Fähræus m. *tripuncticollis* Breuning, 1950c: 46.  
?PT: [Kenya, Ikuta]; ?PT: [D.O. Afrika, Kigonsera].
- Phytoecia haroldii* Fähræus m. *unimaculata* Breuning, 1951: 453.  
?PT: [N.W. Rhodesia, Lusemska, H.C. Dollman, XII.1916]; ?PT: [Salisbury, ill., Mahon].
- Phytoecia haroldii* Fähræus m. *verticepunctata* Breuning, 1951: 453.  
?PT: [N.W. Rhodesia, Lusemska, H.C. Dollman, XII.1916]; ?PT: [Nairobi, B.E.A].
- Phytoecia haroldii* Fähræus m. *vitticollis* Breuning, 1950c: 46.  
?PT: [Kilimandjaro, Sjöstedt., 1905.6. / Kibonoto, kulturz]; ?PT: [Mozambique, Zambezi].
- Phytoecia kolbei* Breuning m. *flavoabdominalis* Breuning, 1951: 445.  
2 ?PT: [Togoland, L. Conradt, 1892-1893].
- Phytoecia kolbei* Breuning m. *rufiantennata* Breuning, 1951: 444.  
HT: ♀, Togo, Bismarckburg.
- Phytoecia kolbei* Breuning m. *togoensis* Breuning, 1951: 444.  
HT: ♀, Togo, Bismarckburg.
- Phytoecia kurdistan* Ganglbauer m. *bitlisensis* Breuning, 1947e: 60.  
HT: ♂, Arménie, Bitlis [1912, Kulzer]; ?PT: [Bitlis, 1912, Kulzer].
- Phytoecia kurdistan* Ganglbauer m. *quinquemaculata* Breuning, 1947e: 60.  
HT: ♂, Erivan [Eriwan, 1898, Korb]; ?PT: [Eriwan, 1898, Korb].
- Phytoecia larvata* Pascoe m. *fuscoantennata* Breuning, 1951: 429.  
?PT: [Shilouvane, H. Junod].
- Phytoecia maculicollis* Peringuey m. *anterufa* Breuning, 1951: 413.  
HT: ♂, Transvaal [Grauer]; ?PT: [Transvaal, Grauer].
- Phytoecia mannerheimi* Breuning m. *atroapicaloides* Breuning, 1951: 369.  
HT: ♂, Chine, province de Shansi [Licent].
- Phytoecia millefolii* Adams m. *obscuripennis* Demelt, 1963b: 96.  
PT: Asia Minor, Silifke.
- Phytoecia neavei* Aurivillius m. *senegalensis* Breuning, 1951: 428.  
2 ?PT: [Sénégal].
- Phytoecia neavei* Aurivillius m. *unimaculicollis* Breuning, 1951: 428.  
HT: ♀, Congo belge, Beni.

- Phytoecia nigriventris* Kolbe m. *anterufipes* Breuning, 1951: 447.  
?PT: [Togo, Bismarckburg].
- Phytoecia nigriventris* Kolbe m. *dimidiatoides* Breuning, 1951: 448.  
?PT: [Belg Kongo].
- Phytoecia nigriventris* Kolbe m. *fuscicornis* Breuning, 1950c: 45.  
2 ?PT: [Kamerun, Mukonje Farm].
- Phytoecia nigriventris* Kolbe m. *nigroantennata* Breuning, 1950c: 45.  
?PT: [Belg Kongo, Beni].
- Phytoecia nigriventris* Kolbe m. *rufina* Breuning, 1950c: 45.  
2 ?PT: [Belg Kongo].
- Phytoecia nigriventris* Kolbe m. *uninotata* Breuning, 1950c: 45.  
2 ?PT: [Kamerun, Mukonje Farm].
- Phytoecia orbicollis* Reiche et Saulcy m. *adanensis* Breuning, 1947e: 60.  
HT: Cilicie, Adana [Asia Minor, Adana, coll. Sterba]; ?PT: [Asia Minor, Taurus eilic, Kricheldorff].
- Phytoecia orbicollis* Reiche et Saulcy m. *ankarensis* Breuning, 1964a: 97.  
HT: ♂, Anatolie, Ankara, Dikmen-deresi, 1.VI.1941, leg. J. Romieux.
- Phytoecia orbicollis* Reiche et Saulcy m. *maraschensis* Breuning, 1951: 54.  
HT: ♂, Marasch, leg. Sahlberg [Taurus]; ?PT: [Taurus, Marasch, V.28, leg. H. Kulzer].
- Phytoecia pontica* Ganglbauer m. *discomaculata* Breuning, 1947e: 61.  
?HT: Syrie, Damas, coll. Breuning [Kastamani]; ?PT: [Damascus / U. Sahlb].
- Phytoecia pretiosa* Falderman m. *basiimmaculata* Breuning, 1947e: 61.  
HT: ♀, Perse; ?PT: [Armenien, Erze □ um, Reitter].
- Phytoecia pretiosa* Falderman m. *nigroconjuncta* Breuning, 1947e: 61.  
HT: Perse, Tabris.
- Phytoecia pseudaficana* Breuning m. *holorufa* Breuning, 1951: 449.  
?PT: [Kenya, Ikutha].
- Phytoecia pseudaficana* Breuning m. *subteratra* Breuning, 1964a: 103.  
HT: ♂, Uganda [Afr. c. coll. Plason]; ?PT: [Kenya, Mo □ □ □].
- Phytoecia pseudolatesuturalis* Breuning m. *bivittipennis* Breuning, 1962b: 15.  
?PT: [Kaimosi].
- Phytoecia puncticollis* Falderman m. *nigrifrons* Breuning, 1951: 86.  
HT: ♀, Luristan, leg. Bodemeyer [Persia].
- Phytoecia puncticollis* Falderman m. *nigroscapus* Breuning, 1951: 86.  
HT: ♀, Luristan, leg. Bodemeyer; ?PT: [Persia, Kereda].
- Phytoecia puncticollis* Falderman m. *quadripunctata* Breuning, 1951: 87.  
HT: ♀, Luristan, leg. Bodemeyer [Persien].
- Phytoecia puncticollis* Falderman m. *transitoria* Breuning, 1951: 85.  
HT: ♀, Luristan, leg. Bodemeyer [Persien]; ?PT: [Persien, Sultarabad, v. Bodemeyer].
- Phytoecia pustulata* Schrank m. *coeruleomicans* Breuning, 1947e: 59.  
HT: Maroc, Meknés.
- Phytoecia pustulata* Schrank m. *parterufoabdominalis* Breuning, 1951: 386.  
HT: ♂, Anatolie, Ak-Chehir [V.26, Kulzer]; ?PT: [Roumanie, Comana Vlasca, A.L. Montandon].

- Phytoecia rubropunctata* Goeze m. *confluentevittata* Breuning, 1947e: 60.  
HT: France, Lyon [Kelecsényi]; ?PT: [Macon].
- Phytoecia rufa* Breuning m. *latesuturevittata* Breuning, 1965b: 284.  
HT: ♀, Nordrhodesien, Abercorn [Rhodésie du Nord, Abercorn, 4.IV.1944, H.J. Brédo].
- Phytoecia ruficollis* Aurivillius m. *ochreicollis* Breuning, 1951: 408.  
HT: ♂, Oubanghi Chari, Bangui; ?PT: [Sénégal, Dakar].
- Phytoecia rufiventris* Gautier de Cottés m. *partenigrecens* Breuning, 1947e: 60.  
HT: ♂, Chine, province Foukien; ?PT: [Hondo, Chinzenji].
- Phytoecia somereni* Breuning m. *fuscoapicalis* Breuning, 1951: 449.  
2 ?PT: [Kenya, Ikutha].
- Phytoecia sublateralis* Breuning m. *rufodiscalis* Breuning, 1951: 435.  
HT: ♀, Angola, Bailundo.
- Phytoecia sylvatica* Hintz m. *atroapicalis* Breuning, 1950c: 44.  
2 ?PT: [Belg Kongo, Ikutha].
- Phytoecia vittata* Peringuey m. *nigrotibialis* Breuning, 1951: 423.  
?PT: [Mosambique, Zoub □ □ □].
- Phytoecia vittipennis* Reiche m. *ordubadensis* Breuning, 1947e: 60.  
?HT: Arménie, Ordubad, coll. Breuning [Caucasus, Araxesthal, Leder. Reitter];  
?PT: [Ordubad, 13 Klzr.].
- Prosopocera vitticollis* Gahan m. *vittipennis* Breuning, 1950b: 6.  
HT: ♀, Transvaal, Shilouane, leg. H. Junod, MHNG. (*Exemplaire non retrouvé dans la collection*).
- Saperda alberti* Plavilstshikov m. *latemaculata* Breuning, 1952: 187.  
HT: ♀, Hokkaido, Insel Yesso.
- Saperda fayi* Bland m. *immaculipennis* Breuning, 1952: 167.  
HT: ♂, Ontario, Ridgeway; ?PT: [ill. Ottawa?, 21.V].
- Saperda lateralis* Fabricius m. *transeuns* Breuning, 1952: 165.  
?HT: Pensylvanie, Corwells, coll. Breuning [Kansas].
- Saperda octopunctata* Scopoli m. *aurata* Breuning, 1952: 183.  
HT: ♀, Lyon.
- Saperda vestita* Say m. *immaculata* Breuning, 1976b: 740.  
HT: ♂, USA, Pennsylvania.
- Scythasis nitida* Pascoe m. *anticerufa* Breuning, 1949: 245.  
?PT: [Burma, ill., Bhurnà]; ?PT: [Malacca, Perak].
- Stenostola anomala* Bates m. *ohbayashii* Breuning, 1952: 211.  
HT: Shikoku, Omogokei, 24.VII.1932, S. Miyamoto, meiner sammlung.  
(*Etiqueté S. glenoides ohbayashi dans la collection*).  
?HT: [Japan, 13.VII.1948 / Agoumai Prof., North Honshi, Obahata]. (*Etiqueté S. anomala m. gleneoides dans la collection*).
- Stenostola callosicollis* Breuning m. *incallosa* Breuning, 1952: 205.  
HT: ♂, Mandschurei, Handaohetzy. [VI.1938]; ?PT: [idem].

*Stibara tricolor* Fabricius m. *holorufipennis* Breuning, 1961e: 160.  
2 ?PT: [Tonkin, Backan].

*Thermistis croceocincta* Saunders m. *reducta* Breuning, 1952: 198 (1956d : 696).  
HT: ♂, Tonkin, Dong-Van, coll. Lepesme; ?PT: [idem].

*Thyestilla gebleri* Faldermann m. *subuniformis* Breuning, 1952: 195.  
HT: ♂, China, Umgebung Peking, leg. Stötzner; ?PT: [Peking, Exp. Stötzner, West berge].

*Thyestilla gebleri* Faldermann m. *transitiva* Breuning, 1952: 195.  
HT: ♂, China, Provinz Kiang-si, Umgebung Kiukiang.

*Tragocephala freyi* Brancsik var. *subnubeculosa* Breuning, 1980a: 29.  
PT: Anosibe, coll. Dujardin-Delacour, Tananarive [XII.68].

*Zosne cachita* Heller m. *vitticollis* Breuning, 1954a: 486.  
HT: ♀, Borneo, Sandakan, leg. Baker.

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## Small mammal inventory in the Shipstern Nature Reserve (Corozal District, Belize, Central America), a preliminary assessment

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**Small mammal inventory in the Shipstern Nature Reserve (Corozal District, Belize, Central America), a preliminary assessment.** - This small mammal inventory was conducted between May and September 2000 in the Shipstern Nature Reserve located at the northeastern limit of Belize in the Corozal District, Central America. In 11840 trap nights, 7 species of non-volant small mammals were captured, including 5 species of myomorph rodents and 2 species of didelphid marsupials. One species, *Ototylomys phyllotis*, accounted for 90.8% of the total captures, and may play a major role in the community structure of mammals in the reserve. The presence of *Peromyscus yucatanicus* in Shipstern Nature Reserve constitutes a first mention for Belize, and suggests that its range is extending more southerly to the limit agreed at present. Observations made on *Sigmodon hispidus* lead to formulate the hypothesis of a morphologically smaller population in the south of Quintana Roo, Mexico, and northern Belize, and further underlines the need for a complete revision of the genus in the Yucatán Peninsula. The sympatric diversity concretely obtained in Shipstern Nature Reserve is certainly underestimated, but nevertheless gives substance to the impression of a rodent community that is clearly affiliated to the partly endemic fauna of the Yucatán Peninsula, Mexico.

**Key-words:** Belize - Yucatán Peninsula - small mammal inventory - Marmosidae - Didelphidae - Heteromyidae - Muridae.

### INTRODUCTION

The information currently available to assess the magnitude and geographic distribution of mammalian diversity in Belize remains incomplete and unevenly representative. Indeed, most collecting has been concentrated in a few historically accessible areas in the Maya Mountains, and further north in the Yucatán Peninsula, and today, very few areas (if any) are characterized by a long history of field work on mammals. Among the most important mammalian surveys, Murie (1935) collected for several weeks in 1931 in the vicinity of Belize City and El Cayo (San Ignacio), British Honduras (today's Belize), on his way to Uaxactun, Petén, Guatemala. In 1939 and 1940, after a brief survey in Jamaica and Haiti, I.T. Sanderson & A. Sanderson spent several months collecting along the coast of British Honduras, from Punta Gorda to the

Bahía de Chetumal, prior to continuing their studies in Quintana Roo, Yucatán, and Chiapas, Mexico – part of their collection was studied by Hershkovitz (1951). Subsequently, additional lists of mammals arose from various research projects. Those include Disney (1968), Dieckman (1973), Kirkpatrick & Cartwright (1975), Burton *et al.* (1987), Rabinowitz & Nottingham (1989), and most recently Caro *et al.* (2001). However, few studies ever focused on the small mammal fauna of Belize. Consequently, methods used to trap marsupials and small rodents often remained adapted to common and generalist species, but proved to be unsuitable to catch specialists and/or rare species. In this context, recent accounts of mammalian diversity in Belize, such as the checklist proposed by McCarthy *et al.* (1998), still probably underestimate the number of small mammal species actually found in the country – this is especially true for the northeastern portion of the country (Corozal District) where studies on the mammalian fauna remain scarce.

In Shipstern Nature Reserve (SNR), as far as can be concluded from the available sources, non-volant small mammals were only briefly surveyed prior to the present study. This was done by Meerman (1993), and Miller *et al.* (1995), in a first attempt to survey the overall mammalian fauna of SNR. Apart from the latter, no other studies on mammals were reported from the reserve, with the exception of a bat inventory carried out by Bärtschi (1998). Nevertheless, other groups of vertebrates, but also invertebrates, were inventoried in SNR. Those include the following checklists: birds, reptiles, amphibians, and some miscellaneous invertebrates (Meerman, 1993); dragonflies and damselflies (Boomsma, 1993); butterflies (Meerman & Boomsma, 1993); and freshwater fishes (Bijleveld, 1990). In addition, beside a checklist of the flora proposed by Meerman (1993), two research projects focusing on the vegetation of SNR were recently carried out by Bijleveld (1998) – structure and floristics – and Sayer (2000) – phenology.

In northern Belize therefore, there is a clear need towards an aggressive programme of short-term mammalian surveys, that are combining the advantage of concreteness – listed species are definitely known to have occurred together at a particular place and time – with the disadvantage of incompleteness. Indeed, although indispensable, a long-term inventory project would inevitably be time-consuming and expensive, now bulldozers and chain saws work faster than field biologists (Voss & Emmons, 1996). In this context, the most important role for this project was to rapidly provide crucial diversity data – maximized by focusing on marsupials and rodents, that is taxa known to respond to ecological or zoogeographic gradients – for future research and conservation objectives implicating the Shipstern Nature Reserve and its surrounding areas. In this respect, the primary objective was to obtain fresh material – voucher specimens that are well preserved, complete, precisely labeled, and documented with exhaustive and informative data – to be subsequently incorporated in the collections of the Natural History Museum, Geneva (MHNG), Switzerland. In turn, the liver was sampled, and saved for DNA preservation, from each of these voucher specimens, so as to constitute a precious tissue collection, completed with ear biopsies sampled from the specimens released in the field. These ear and liver samples were taken for inclusion into the Collection of Preserved Mammalian Tissues (Catzefflis, 1991) held at Montpellier, France, where they are at the disposal of scientists.

Apart from recording the small mammals and preserving their DNA, the other objective of this study was to collect their ectoparasites, and list the endoparasites of their digestive tract – giving priority to the classes Trematoda and Cestoidea, and the phylum Nemata – to be included in the MHNG museum collection. Indeed, obtaining parasites from mammals that are collected during inventories is also time-consuming, and such collections have rarely been made. Parasites and other symbionts are important components of the biology of the host, however, and must be sampled for a complete picture of its ecology and other aspects of its life history. Of course, studies of the systematics and ecological characteristics of hosts and parasites require proper identification of both groups. Now, as far as the ecto- and endoparasites collected in SNR are concerned, this could not be achieved, and deeper analyses will be carried out within the framework of a subsequent study.

## STUDY AREA

Previously owned by a British Limited Company, the area was partly managed as a private reserve during the eighties known as the Shipstern Wildlife Preserve. In 1989, it became the property of the International Tropical Conservation Foundation (ITCF), and the name Shipstern Nature Reserve was given. This newly created foundation followed the opening of the tropical butterfly garden Papiliorama of Marin-Neuchâtel in Switzerland, in 1988. Today a major tourist attraction, and further developed as the Papiliorama Swiss Tropical Gardens in Kerzers, Fribourg, it is actively concerned with the conservation of tropical biodiversity through two sister-foundations: the Papiliorama-Nocturama Foundation in Switzerland, and the ITCF in Belize. Thus, among other projects involving the local community, two new protected areas were opened by the ITCF during the last few years: the Xo-Pol area in 1994; and the Sarteneja National Tree Park in 1999. In parallel, the ITCF assisted the Belize Coastal Unit in the creation of the Bacalar Chico National Park & Marine Reserve, in 1996, which is part of the Belizean network of the UNESCO World Heritage Sites. At the same time in SNR, scientific work has been and is being further developed by the ITCF in conjunction with the universities of Bern, Neuchâtel, and Fribourg, Switzerland.

Located at the northeastern limit of Belize in the Corozal District (Figs 1, 2), the Shipstern Nature Reserve covers an area of approximately 9000 hectares (22000 acres). It encompasses part of the Shipstern Lagoon, which is in direct contact with the southern waters of Chetumal Bay, and it also includes the separate surface of Xo-Pol (600 hectares). By land, the only means of access to the area is an all-weather road starting at Orange Walk, and ending at the fishermen village of Sarteneja.

Apart from a coastal plain stretching all along the Belizean coast, the whole area between Belmopan and Corozal (Fig. 1) is covered by lowlands that are further extending northward from Chetumal to Cancún on the eastern side of the Yucatán Peninsula, Mexico. To the southwest, these northern lowlands give way to the Maya Mountain massif, the dominant physical feature in Belize, which is the only area where large upfaulted blocks of intrusive and associated metamorphic sedimentary rocks are preponderant (Hartshorn *et al.*, 1984). Such a substrata with only a thin soil cover means that water is essentially drained on the surface, thus constituting an extensive

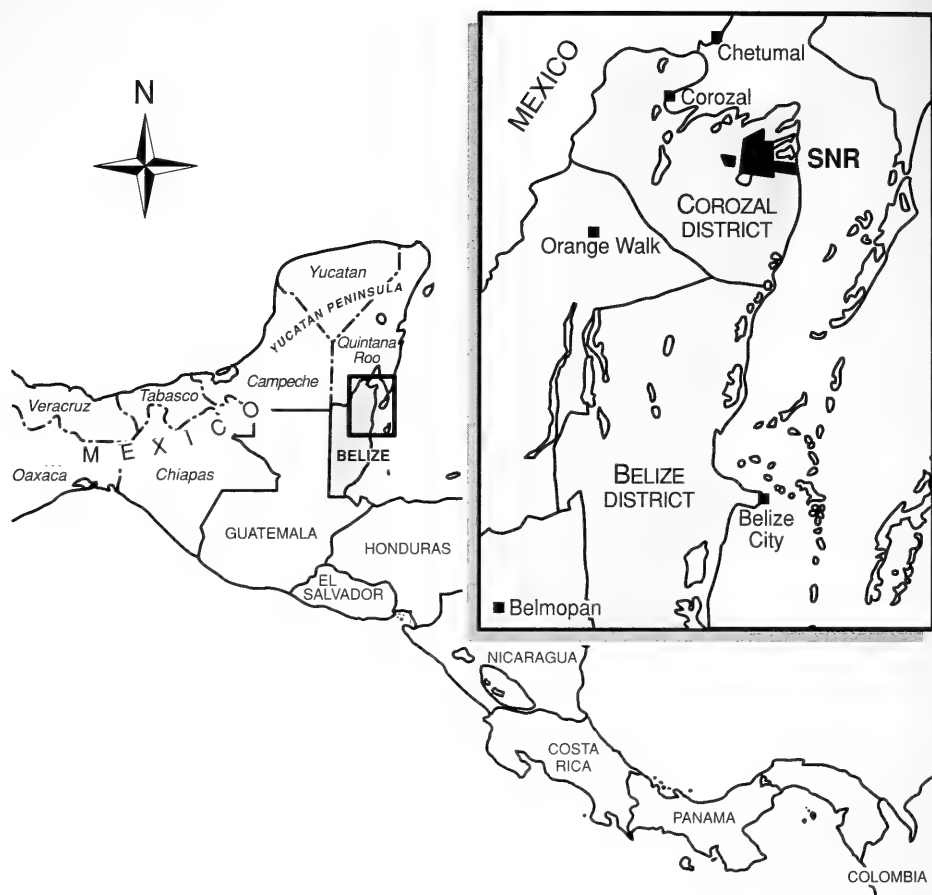


FIG. 1

Political map of Central America and northern Belize. SNR, Shipstern Nature Reserve.

system of streams and rivers. By contrast, a small scale karst topography is developed in the northern lowlands covered by tertiary limestones, and the area of SNR is thus characteristic with numerous sinkholes, caves, and natural wells, virtually no stream and river system on the surface, and elevations not exceeding 4-5 m (17 ft).

Rainfall at the reserve was measured over a period of four years, between October 1989 and October 1993 (Meerman & Boomsma, 1993). An average annual rainfall of 1260 mm (49.6 inches) was recorded, with a minimum at 1029 mm (40.5 in.), and a maximum at 1610 mm (63.4 in.) – for comparison, annual rainfall shows a considerable increase from north to south in Belize, averaging 1850 mm (73 in.) at Belize City (Belize District), and 4526 mm (178 in.) at Barranco (Toledo District). Such results suggest that Shipstern Nature Reserve is in one of the driest areas in Belize, with a pronounced dry season – in the year of the present study, the months of



February and March appeared to be exceptionnally dry, with no rainfall and 10 mm (0.4 in.) respectively (Sayer, 2000). As a consequence, the water level of the Shipstern Lagoon fluctuates on a yearly cycle, and areas close to the lagoon are temporarily flooded during the wet season.

Indeed, rainfall tends to vary markedly in Belize. It starts with a pronounced dry season between the months of January and May. Then, from June to December, rainfall increases gradually to reach a maximum in September. And some years, this is precisely any time from September to November that the wet season turns to a hurricane season. However, if Belize is frequently facing tropical storms, few hurricanes ever reach the country. And as far as the Shipstern Nature Reserve is concerned, among those that did in the past, only two are known to have caused serious damages. The first one, hurricane Janet, hit Belize in 1955, and greatly affected the northern part of the country. As a result, the villages of Sarteneja and Shipstern (Fig. 2), as well as Corozal Town were completely destroyed, whereas the forests in and around the present reserve were almost entirely flattened and burnt by subsequent fires. Because of this, the vegetation of Shipstern Nature Reserve can be considered as being 47 years old, and most of its vegetation types have not yet reached a structural climax. The second one, hurricane Keith, hit the country during the course of the present study, in early October. And if the reserve still suffered from localized falls of large trees, damages caused directly by the wind remained unextensive in the Corozal District—Keith mostly affected San Pedro (Ambergris Cay) and Cay Caulker, both comprised in the range of islands spreading all along the coast. However, unusual fluctuations of the water level caused by extreme rainfalls and inland accumulation of water carried in by the wind, led to serious floods. As a result, the water depth in the Shipstern lagoon was estimated at 4-6 feet, and the village of Chunox, as well as Orange Walk remained surrounded by floods for weeks.

Temperatures exceeding 40°C (104°F) have already been measured in the country (Walker, 1973). And, it is not uncommon to see the temperatures dropping as low as 10°C (50°F) between the months of November and December, when cold air masses enter the country from the north-east. More commonly, however, mean monthly minima range from 16°C (60.8°F) in winter to 24°C (75.2°F) in summer, and maxima from 28°C (82.4°F) to 33°C (91.4°F), with an annual mean temperature of 26°C (78.8°F) (King *et al.*, 1992).

Despite a long-established timber industry, and a history of successive destructions due to natural phenomena, Belize remains covered by substantial areas of natural vegetation. Nowadays, however, an increased demography in Belize coincides with an increased pressure on the forest areas and on the fauna. Of primary concern is the rapid expansion of cultivated lands in the surroundings of the Shipstern Nature Reserve. Indeed, slash and burn cultivation is more and more common in the vicinity of Xo-Pol, whereas a worrying increase in agricultural activities carried on by Mennonites is observed from Little Belize towards Shipstern Lagoon. In addition, selective logging aimed at species such as Santa Maria (*Callophyllum brasiliense*), Ciricote (*Cordia dodecandra*), and Mahogany (*Swietenia macrophylla*) is expanding throughout the eastern forests of Corozal District, and in particular those around Fireburn which are virtually empty of their large trees.

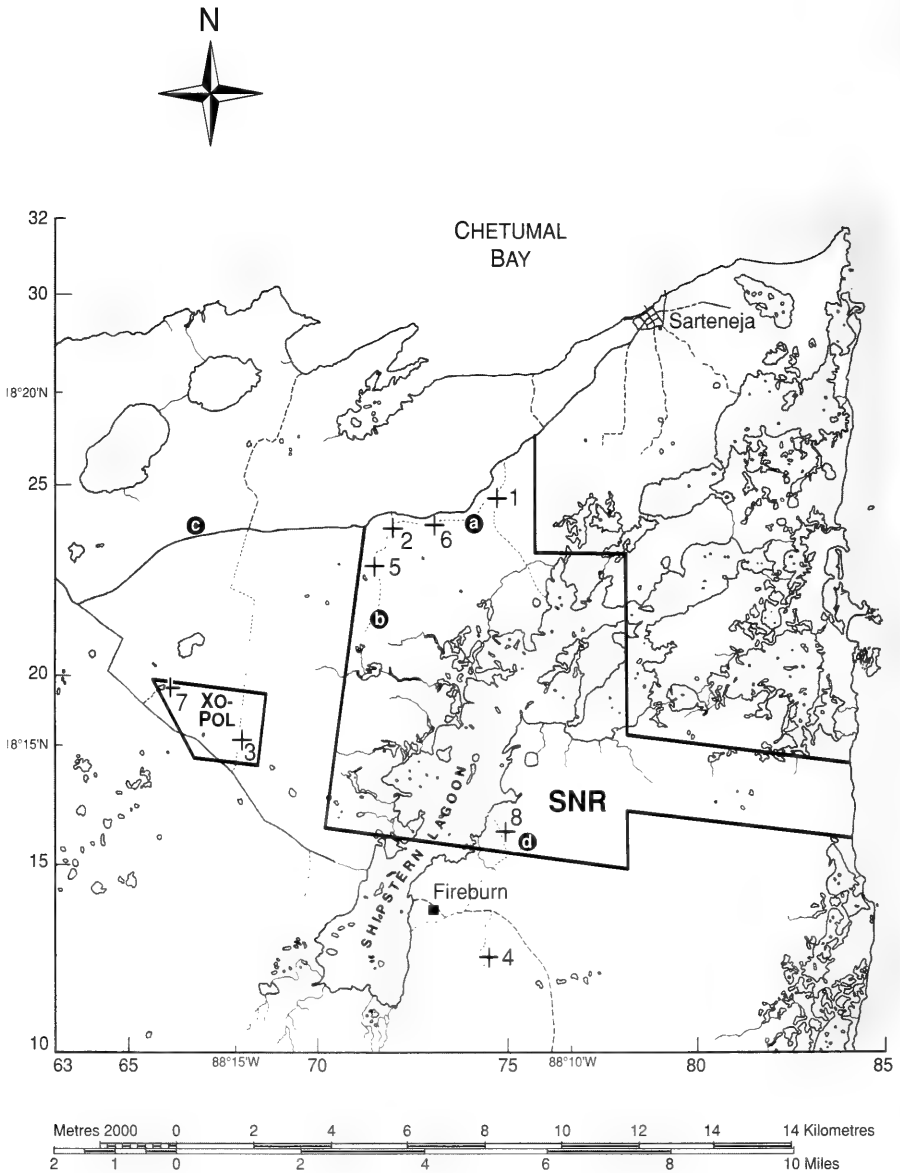


FIG. 2

Map of Shipstern Nature Reserve (SNR). 1-8, trapping sites; a, New Trail; b, Main Trail; c, Main Road; d, Shipstern Old Village. Grid : Universal Transverse Mercator and WGS 84.

In this context, the Shipstern Nature Reserve plays an important role in the country representing one of the very few protected areas in the northern lowlands. Indeed, as far as Belize is concerned, the Yucatecan medium-sized semi-evergreen forests (Table 6) – still well represented over most of the Yucatán Peninsula, this forest

type was probably covering the whole Corozal District before the expansion of sugar cane fields – as well as the very rare Yucatecan medium-sized semi-deciduous forests, are almost exclusively found in and around the reserve. Furthermore, the latter protects the unique patch of Low semi-deciduous *Pseudophoenix s.sargentii* forest distributed on mainland Belize, other patches being localized in the Bacalar Chico National Park & Marine Reserve, and in the Yucatán Peninsula mainly.

With about a third of the surface being occupied by the Shipstern Lagoon, habitats in the reserve appear to be diverse and patchily distributed. Indeed, the lagoon constitutes an intricate system of shallow waters (1-3 feet) bordered by dwarf mangroves and other saline wetlands – listed in the Directory of Neotropical Wetlands (IUCN/IWRB, 1986) – and dotted with numerous small mangrove islands. Besides, so called “forest islands” are randomly distributed in the transitional areas with true forest. And the latter tends to vary considerably in its structural and floristic characteristics, thus creating a complicated mosaic of various forest types – the patches of which are sometimes less than 50 ft wide – that are not always clearly delimited. Aiming for a better understanding of its vegetation, Bijleveld (1998) listed seven main vegetation types within Shipstern Nature Reserve, to which the Cohune forest described by Wright *et al.* (1959) can be added (Table 6).

## MATERIALS AND METHODS

Referring to the geographic distribution of the vegetation types listed in table 6, four areas – named New Trail, Main Trail, Xo-Pol, and Shipstern for more convenience – were selected in and around Shipstern Nature Reserve. Chosen on the basis of their accessibility and the presence of ecotones between characteristic habitats, two trapping sites were attributed to different localities within each of these areas. Thus, trapping sites 1/6, 2/5, 3/7, and 4/8, were representative of the New Trail, Main Trail, Xo-Pol, and Shipstern areas respectively (Fig. 2).

Each of the eight trapping sites were identically built by reproducing a standardized trap design (Patton *et al.*, 2000). It consisted of two parallel transects separated by a distance of 500 ft (150 m). Each trapping line was 940 ft (285 m) in length and subdivided into 20 trap stations at 50 ft (15 m) intervals. In turn, four traps were positioned at each trap station, for a total number of 160 traps per trapping site.

One folding Sherman (23 x 7.5 x 7.5 cm) and three folding BTS – Besançon Techniques Services, Besançon, France – mesh (28 x 10.5 x 10.5 cm) live traps were set at each trap station. Traps were placed in the most likely microhabitat within 7 to 17 ft (2-5m) of the station marker. Wherever possible, two BTS mesh live traps were positioned from a height of 4 to 14 ft (1-4 m), whereas the third one remained terrestrial. The Sherman live trap was always set on the ground. For bait, the dried fruit of Guaya trees (*Talisia olivaeformis*) was fixed on the hook of BTS mesh live traps, and coated with peanut butter – no baits were used for Sherman live traps.

All traps were left open for 10 consecutive nights, thus totalling 1600 “trap nights” per locality (Wilson *et al.*, 1996). Eight trapping sessions were scheduled over a 6 month time interval in the year 2000, and effective trapping periods took place at the dates presented in table 3. The last trapping session (site n°8) totalled only 640 trap

nights, having been brutally interrupted under the threat of hurricane Keith. Therefore, trapping effort for all 8 trapping sessions together totalled 11840 trap nights.

First captures of newly encountered species were systematically brought back to the base camp for a first identification based on the external morphology. At the same time, ectoparasites and intestinal endoparasites were sampled along with the liver. After collection of several male and female adults within one species, the specimens captured successively and satisfactorily identified as belonging to the same species were only then released. Standard data – external measurements, weight, sex, age,... – along with an ear sample – a triangular incision of 4-5 mm in the ear pinna – were collected from each individual to be released. The animal was thus marked and recognized if recaptured.

External measurements are expressed as follows (Nagorsen & Peterson, 1980; Catzefflis *et al.*, 1997; Musser *et al.*, 1998): **E**, ear length (distance from the base of the notch of the lower part of the ear to the uppermost margin of the ear); **HF**, hind foot (distance from the end of the heel bone, calcaneum, to the end of the longest toe, exclusive of the claw); **NEB**, nose-ear basis (distance from the tip of the nose to the base of the notch of the lower part of the ear); **NEC**, nose-eye corner (distance from the tip of the nose to the anterior corner of the eye); **SR**, scale rows (number of scale rows in a centimeter section of the tail about one-third from the body); **TL**, total length (straight-line distance from the tip of the nose to the end of the last tail vertebra, exclusive of hair); **TV**, tail vertebrae (distance from the base of the tail to the tip of the last vertebra, exclusive of hair).

At MHNG, the voucher specimens were essentially re-identified by referring to their corresponding skull measurements and cranial characters. The latter data was compared to that found in available literature by first assigning age classes – juvenile, immature, subadult, adult, or old adult (Wilson *et al.*, 1996) – based on tooth eruption and wear to each specimens. Then, whenever a set of skull measurements was not clearly affiliated to one species, distinctive cranial characters were considered as reliable. In addition, the data obtained in the field was finally reexamined, along with the known distribution of the diagnosed species. As a result, the final identification of each specimen was based on the following data: external morphology, external and skull measurements, cranial characters, and distribution.

In murid rodents, skull measurements (Fig. 3) are expressed as follows (Patton *et al.*, 2000; Musser *et al.*, 1998; Voss, 1988): **BB**, braincase breadth; **BBP**, breadth of bony palate; **BIF**, breadth of incisive foramina; **BL**, length of auditory bulla; **BM1**, breadth of first upper molar; **BOL**, basioccipital length; **BR**, breadth of rostrum; **BW**, breadth of auditory bulla; **BZP**, breadth of zygomatic plate; **CBL**, condylobasal length; **CD**, cranial depth; **CIL**, condyloincisive length; **CLM1-3**, crown length of maxillary toothrow; **CLMT**, crown length of mandibular toothrow; **DI**, depth of incisor; **HI**, height of incisor; **IB**, interorbital breadth; **LB**, lambdoidal breadth; **LBP**, length of bony palate; **LD**, length of diastema; **LIF**, length of incisive foramina; **LM**, length of mandible; **MB**, mastoid breadth; **MPFL**, mesopterygoid fossa length; **MPFW**, mesopterygoid fossa width; **NL**, nasal length; **OCB**, occipital condyle breadth; **OL**, orbital length; **ONL**, occipitonasal length; **PL**, palatal length; **PPL**, postpalatal length; **RL**, rostral length; **ZB**, zygomatic breadth.

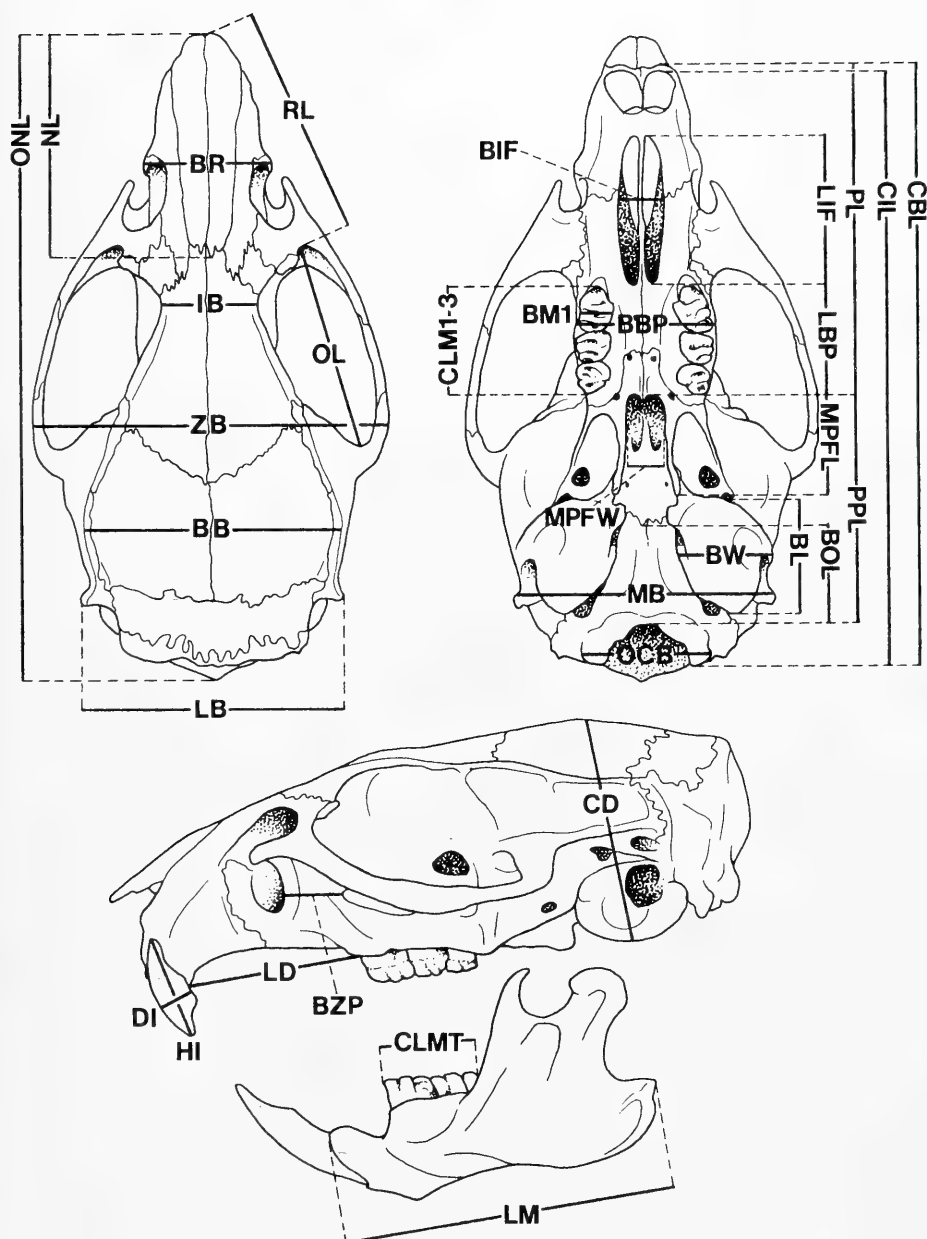


FIG. 3

Rodents, limits of 33 cranial and dental dimensions. Abbreviations are defined in text.

In marsupials, skull measurements (Fig. 4) are expressed as follows (Patton *et al.*, 2000; Gardner, 1973): **BB**, braincase breadth; **BN**, greatest breadth of nasals; **BOL**, basioccipital length; **BRF**, breadth of rostrum across frontals; **BRJ**, breadth of rostrum across jugals; **CBL**, condylobasal length; **CD**, cranial depth; **CLMT**, molar tooththrow length (mandible); **C-M4**, maxillary tooththrow length; **IB**, interorbital breadth; **IOC2**, postorbital constriction; **LM**, length of mandible; **MB**, mastoid breadth; **M1-M4**, molar tooththrow length (maxillary); **NL**, nasal length; **OCB**, occipital condyle breadth; **ONL**, occipitonasal length; **PL**, palatal length; **PPL**, postpalatal length; **PW**, palatal width; **RL**, rostral length; **RW**, rostral width; **ZB**, zygomatic breadth.

A first capture (Table 1) was defined as the first occasion that an individual was trapped and marked (Stallings, 1989). The first capture plus subsequent captures of each specimen were considered total captures. Recapture indices were calculated by dividing total captures by first captures, thus indicating the average number of times an individual of each species was captured. The number of trap nights (Table 3) was calculated by the number of traps multiplied by the number of nights the traps were activated per site (Wilson *et al.*, 1996). The trapping success (Table 3) for a site was the number of total captures of all species divided by the number of trap nights and expressed in percentage. The standard error for each external and cranial measurements (Tables 4, 5) was calculated after Fowler *et al.* (1998).

## RESULTS

Capture results by species for the eight trapping sites are presented in table 1. Seven small mammal species were sampled: *Marmosa mexicana* (Merriam, 1897), *Didelphis virginiana* (Kerr, 1792), *Heteromys gaumeri* (Allen & Chapman, 1897), *Otonyctomys hatti* (Anthony, 1932), *Ototylomys phyllotis* (Merriam, 1901), *Peromyscus yucatanicus* (Allen & Chapman, 1897), and *Sigmodon hispidus* (Say & Ord, 1825). Overall, *O.phyllotis* represented 90.8% and 86.6% of the total and first captures respectively. On average, individuals of this species were recaptured at a rate of 1.8 times. Trapping success by trapping site is presented in table 3. A total of 414 captures was obtained in 11840 trap nights, thus yielding an overall trapping success of 3.5%. Table 2 presents for each species the number of total captures per vegetation type (Table 6). However, caution should be taken when comparing the latter results, as the trapping effort is unequal from one vegetation type to another. External and cranial measurements by species presented in tables 4 and 5 combine adult males and females. Here again, attention should be given as the single specimens of *D.virginiana* and *O.hatti* are immature and subadult respectively.

## SPECIES ACCOUNTS

The following accounts present the essential observations regarding the morphological description – skull and hindfoot – the local distribution, and the habitat of the 2 species of marsupials and 5 species of rodents captured in Shipstern Nature Reserve. Additional observations of these species are presented in the referred literature. The attribution of a name species to the specimens collected in SNR is also discussed, knowing that few genera of Neotropical rainforest mammals are wholly free of taxonomic problems.

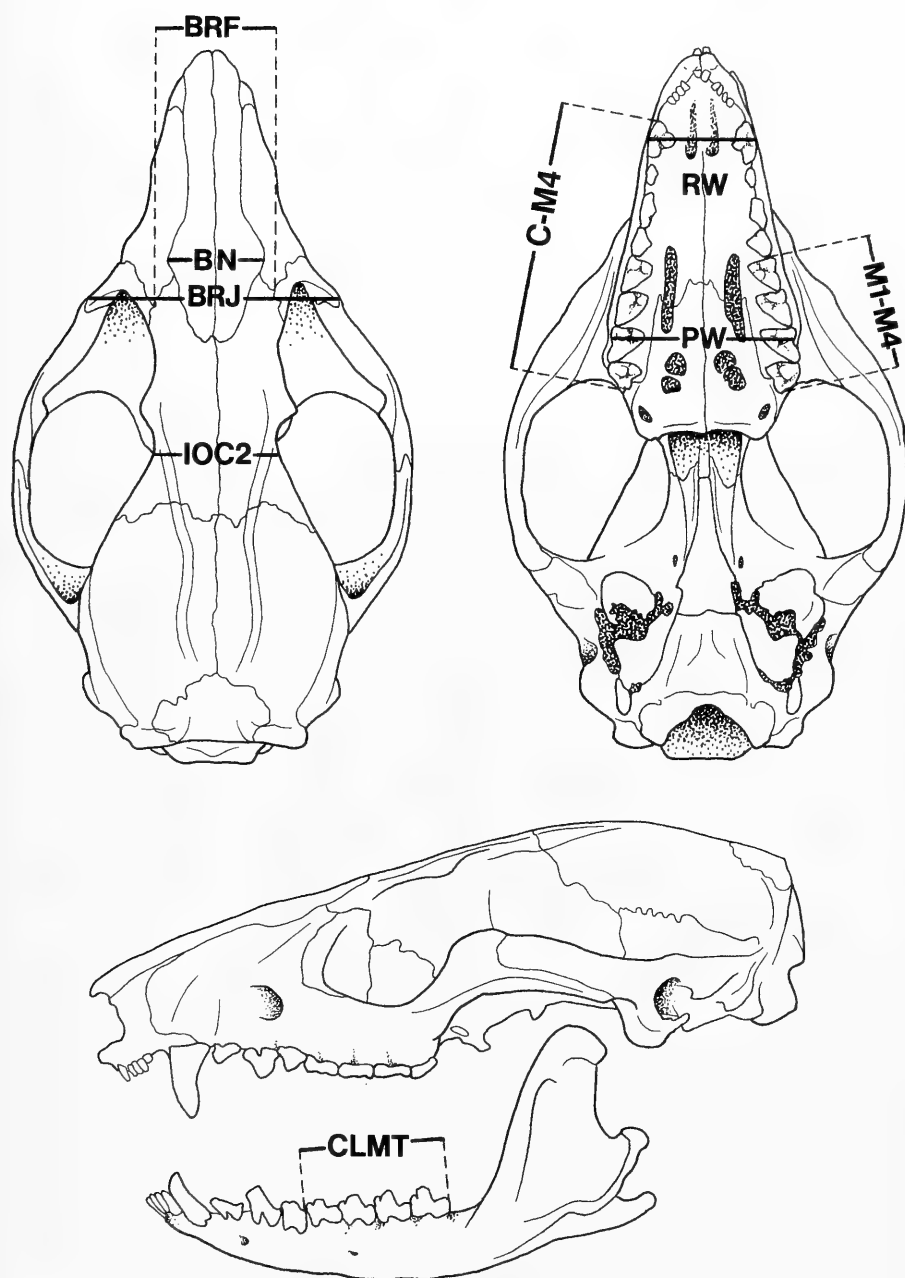


FIG. 4

Marsupials, limits of 9 cranial and dental dimensions. Abbreviations are defined in text. Other measurements, see figure 3.

## Family MARMOSIDAE

*Marmosa mexicana* (Merriam, 1897)

Figs 5, 8

## Mexican Mouse Opossum

**DESCRIPTION.** The cranium is broad and moderately elongate, with a convex dorsal profile (Fig. 5). The rostrum is rather short and broad, concealing the nasolacrimal capsules in dorsal view. The nasals are long and truncate posteriorly, projecting anteriorly beyond the premaxillae to conceal the nasal orifice from dorsal view. The zygomatic arches are stout, convex from the dorsal aspect, convergent anteriorly, and forming a clear elbow-shaped bend in lateral view. The inferior zygomatic root is running on from M4 posteriorly. The interorbital region is broad relative to braincase, without pronounced postorbital constriction. The supraorbital ridges are moderately grooved dorsally, project laterally only slightly, and transform posteriorly into conspicuous parietal ridges on top of braincase. The braincase is narrow, uninflated, with slanting lateral, and nearly vertical rear walls. Occipital ridges are present, but temporal and lambdoidal ridges are not. The auditory bullae are small and moderately rounded, and their anterior margin lies anteriorly to the basisphenoid/basioccipital suture. The basisphenoid is narrow and elongate, contrasting with a short and wide basioccipital. The bony palate is broad, fenestrated, and extends beyond the molar rows posteriorly. The anterior margin of the maxillary/palatine suture lies anteriorly to M2. The incisive foramina are short, inconspicuous, and their posterior margin is level with the posterior face of the upper canines. The teeth are small and number 50. The maxillary toothrows are straight along their labial margins, and convergent anteriorly. The canines are rather short and slender, and PM1 is remarkably smaller than PM2. The dental formula is : i 5/4, c 1/1, p 3/3, and m 4/4. The dentary has a long and stout coronoid process, a well developed condyloid process, a rather delicate angular projection, and a moderately deep and elongate ramus.

Pes has swivelling ankle joints, and opposable hallux (Fig. 8). The plantar surface of pes is unpigmented, devoid of distinctive scalation, naked from heel to tips of the digits, with little fringing hairs along its contour, and with four separate interdigital and two separate carpal pads; the thenar and first interdigital, and the hypothenar and fourth interdigital pads are nearly fused. Dorsal and lateral surfaces of the metatarsal region and digits are a pale cinnamon and naked-looking, sparsely covered with very short white hairs. Digit I is devoid of claw, and claws on digits II to V are short and unpigmented, with inconspicuous tufts of hair at their base.

**DISCUSSION.** *M. mexicana* is easily confused with *M. robinsoni*. But, whereas *M.m.* is ubiquitous and a typical Central American endemic (McCarthy *et al.*, 1998), *M.r.* was previously known only from Panama, with disjunct populations in southern Belize and Roatán Island in Honduras (Reid, 1997). However, *M.r.* has recently been reported in Guatemala and El Salvador, so that it may be present throughout Central America, and specimens may have been confused with *M.m.*. A reappraisal of all specimens of the two species in Central America is therefore needed to determine their exact distribution.

On the basis of external characters, *M.m.* and *M.r.* are hardly distinguishable, although *M.r.* is usually larger, with a longer and slightly wooly fur (Reid, 1997). Thus,



these species are best distinguished by skull characters when adult. In the case of VB054 (MHNG n°1812.007), external and cranial measurements (Tables 4, 5) tally perfectly with those of *M.m.* in Alonso-Mejía & Medellín (1992), but are rather at the bottom of the ranges given for *M.r.* in O'Connell (1983). Furthermore, it is clearly characterized by its supraorbital ridges that are moderately grooved dorsally, and project laterally only slightly (Alonso-Mejía & Medellín, 1992), and its postorbital constriction that is not as pronounced as in *M.r.* (O'Connell, 1983).

Serious conclusions on habitat and local distribution cannot be drawn from a single capture (Table 1). Nevertheless, apart from the strong morphological adaptations towards arboreality observed in VB054, the habitat description in Reid (1997) leads to infer that *M.m.* is probably ubiquitous in the forests of Shipstern Nature Reserve.

#### Family DIDELPHIDAE

##### *Didelphis virginiana* (Kerr, 1792)

Figs 5, 8

##### Virginia Opossum

**DESCRIPTION.** The cranium is elongate and broad, with a convex dorsal profile (Fig. 5). The rostrum is long and broad, concealing the nasolacrimal capsules in dorsal view. The nasals are long, narrow, and truncate posteriorly, revealing the nasal orifice in dorsal view. The lateralmost extent of each nasal, where intercepted by the maxillo-frontal suture, is aligned from the point where the same suture meets the lacrimal. The lacrimal recedes from the outer margin of the jugal before terminating in an acute point on the superior zygomatic root. The zygomatic arches are stout, convex from the dorsal aspect, and convergent anteriorly. The inferior zygomatic root is running on from M2 posteriorly; M3 is barely erupting. The dorsal extension of the palatine bones that make up part of the inner wall of the orbits is broad. The interorbital region is broad relative to braincase, without pronounced postorbital constriction. The supraorbital ridges are unextensive, moderately grooved dorsally, project laterally only slightly, and transform posteriorly into conspicuous but short and convergent parietal ridges on top of braincase. The braincase is narrow, uninflated, with slanting lateral, and nearly vertical rear walls. Occipital ridges are present, but temporal and lambdoidal ridges are not. The auditory bullae are remarkably small and barely rounded, and their anterior margin lies slightly anteriorly to the basisphenoid/basioccipital suture. The basisphenoid is narrow and rather elongate, contrasting with a short and wide basioccipital. The bony palate is broad, fenestrated, and extends beyond the molar rows posteriorly. The anterior margin of the maxillary/palatine suture lies slightly posteriorly to the margin between M1 and M2. M4 and PM3 are absent, whereas M3 and m4 are erupting. The incisive foramina are short, inconspicuous, and their posterior margin is level with the anterior face of the upper canines. The teeth are fairly broad and number 44. The maxillary toothrows are straight along their labial margins, and convergent anteriorly. The canines are rather short and stout, and PM1 is remarkably smaller than PM2. The dental formula is: i 5/4, c 1/1, p 2/2, and m 3/4. The dentary has a long and broad coronoid process, a well developed condyloid process, a small but rather stout angular projection, and a deep and elongate ramus.

Pes has swivelling ankle joints, and opposable hallux (Fig. 8). The plantar surface of pes is dark brown, with distinctive scalation, naked from heel to tips of the digits, with little fringing hairs along its contour, and with four separate interdigital and one carpal pads; the hypothenar and fourth interdigital pads are fused, and the thenar and first interdigital pads are nearly so. Dorsal and lateral surfaces of the metatarsal region and digits are blackish and sparsely covered with short black hairs. Digit I is devoid of claw, and claws on digits II to V are relatively long and unpigmented, with tufts of black hair at their base.

DISCUSSION. *D. virginiana* may be difficult to distinguish with certainty from *D. marsupialis* by sight. Also, both species are ubiquitous in Central America – *D.m.* extends from NE Argentina, Bolivia, and Peru in South America to northern Mexico (Reid, 1997), whereas *D.v.*, which is thought to have arisen from *D.m.* (Gardner, 1973), is not found any further than NW Costa Rica, but extends northerly to southern Canada – and are expected to be sympatric in Shipstern Nature Reserve.

Perhaps the most distinctive and easily observed external character separating *D.v.* and *D.m.* is the hair color of the cheek region (Gardner, 1973): it is pure white in *D.v.*, and clearly set off from the rest of the head by the darker color of the sides and neck behind, and by a dark band extending from the ear through the eye above. Also, the extent of the black pigmented basal portion of the tail ranges from half to all black in *D.v.* (Reid, 1997), whereas it tends to be less in *D.m.*, a criterion however considered as too variable for broad application by Gardner (1973). Additional characters observed in *D.v.*, such as long white mystacial and genal whiskers, and more evenly distributed guard hairs over the dorsum, can be useful to separate *D.v.* from *D.m.*, but are still not determining in some cases. Among others, the single specimen captured in this study (VB062, MHNG n°1812.008) is assigned to the age class 2 (Gardner, 1973), and is probably too young to be distinguished with certainty. For the same reason, the external and cranial measurements of VB062 (Tables 4, 5) are not comparable with those given for *D.v.* in McManus (1974), Gardner (1973), and Goodwin (1969). Nevertheless, *D.v.* and *D.m.* can be separated by skull characters that are independent of age classes (Gardner, 1973). Thus, VB062 is clearly characterized by its bone configuration in the naso-lacrimal and lacrimo-jugal regions, and on the inner wall of the orbit.

Just as in the case of VB054, the clear morphological adaptations observed in VB062 confirm that it is highly scansorial. Furthermore, the habitat description in Reid (1997), and McManus (1974), leads to infer that *D.v.* is also ubiquitous in the forests of SNR.

#### Family HETEROMYIDAE

***Heteromys gaumeri*** (Allen & Chapman, 1897)

Figs 6, 8

Gaumer's Spiny Pocket Mouse

DESCRIPTION. The cranium is elongate and rather slender, with a convex dorsal profile (Fig. 6). The rostrum is long and broad, concealing the nasolacrimal capsules in dorsal view. The nasals are long with slightly convergent outer margins posteriorly, and they project anteriorly beyond the premaxillae to conceal the nasal orifice from

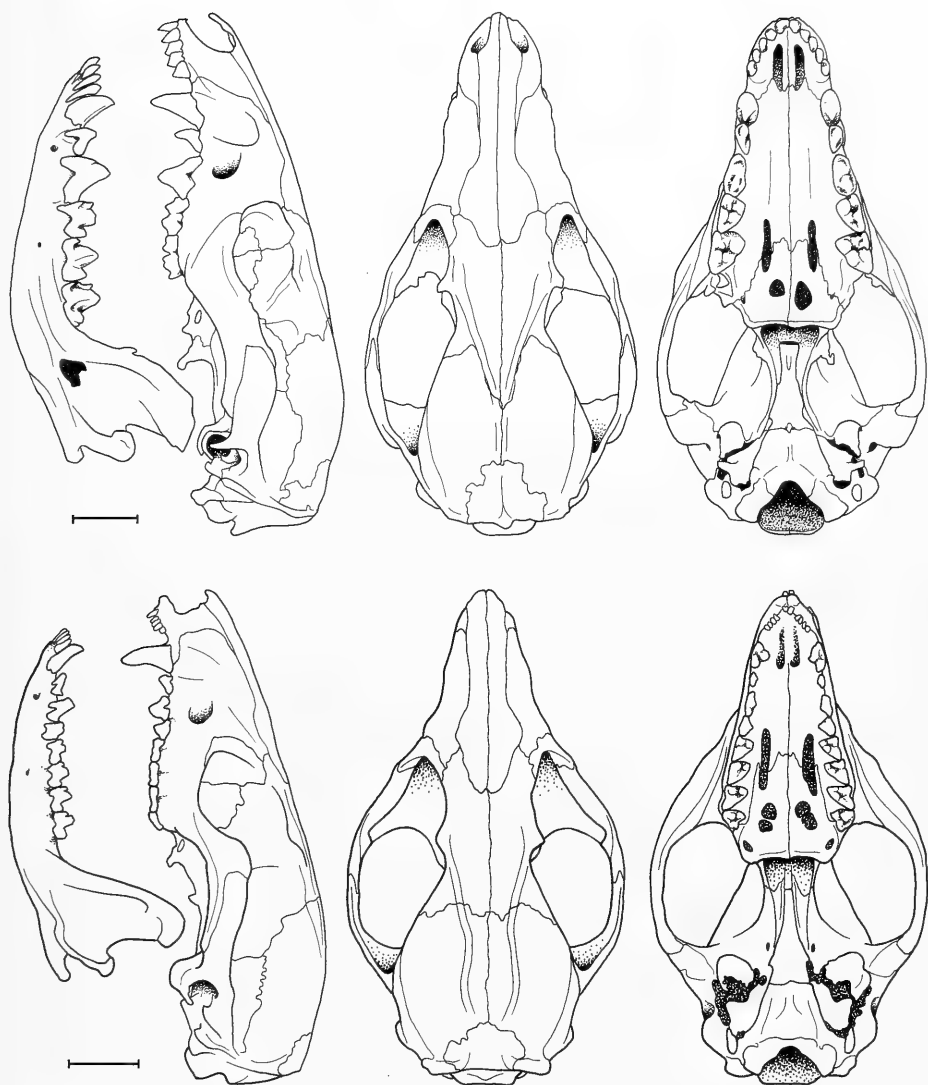


FIG. 5

**Top**, *Didelphis virginiana* (VB062/MHNG n°1812.008); **bottom**, *Marmosa mexicana* (VB054/MHNG n°1812.007). Dorsal, ventral, and lateral view of cranium and lateral view of left dentary. Scale bars: 5 (*M.m.*) and 7 (*D.v.*) mm.

dorsal view. The zygomatic arches are slender, only slightly convex from the dorsal aspect, and convergent anteriorly. The interorbital region is remarkably broad relative to braincase. Supraorbital shelves accentuate the dorsolateral margins of the interorbit and transform posteriorly into low temporal ridges extending to inconspicuous lamb-

doid ridges. The supraorbital ridges are moderately grooved dorsally. Occipital ridges are present, and the supraoccipital crest is angular but barely visible in dorsal view. The braincase is moderately inflated but not globose, with nearly vertical lateral and rear walls. The auditory bullae are moderately large and not clearly rounded; their anterior margin lies anteriorly to the basisphenoid/basioccipital suture. The basisphenoid is narrow and short, contrasting with an elongate and moderately wide basioccipital. The bony palate is narrow, without fenestration, and extends beyond the molar rows posteriorly. The anterior margin of the maxillary/palatines suture is level with M2. The incisive foramina are very short and inconspicuous; the premaxillary-maxillary suture joins their posterior margin. The teeth number 20. The molar toothrows are straight along their labial margins, and convergent anteriorly. Incisors are moderately large with smooth orangish enamel faces; in lateral profile, the uppers curve back toward the molar rows, an opisthodont configuration. The dental formula is : i 1/1, c 0/0, p 1/1, and m 3/3. The dentary has a short coronoid process, a rather long and stout condyloid process, a well developed angular projection and a deep but short ramus; the capsular process is visible.

The plantar surface of pes is unpigmented around the interdigital pads and on digits, and is otherwise dark brown; it has four separate interdigital and two separate carpal pads, with distinctive scalation (Fig. 8); it is thinly covered with short dark brown or reddish hairs from heel to thenar and hypothenar pads, with little fringing hairs along its contour. Dorsal and lateral surfaces of the metatarsal region and digits are whitish, and thinly covered with short white hairs. The three middle digits are much longer than the outer two, and interdigital webbing is present between digits II, III, and IV. The claw on digit II is enlarged. Claws are otherwise short and unpigmented, with inconspicuous tufts of hair at their base.

**DISCUSSION.** *H. gaumeri* is endemic to the Yucatán Peninsula, and its southern range extends no further than N Belize and N Guatemala (Reid, 1997), where it is likely to be found in sympatry with *H. desmarestianus*—although a typical Central American endemic (McCarthy *et al.*, 1998) seemingly absent from the state of Yucatán, Mexico, *H.d.* has been reported to the west of Chetumal, Quintana Roo, Mexico (Jones *et al.*, 1974).

However, *H.g.* differs from all other species of the genus *Heteromys* by the presence of hair on the posterior portion of the sole of the hind foot (Schmidt *et al.*, 1989). Also, whereas very few skull characters are known to separate them, *H.g.* is distinguished from *H.d.* by a discontinuous pelage coloration between the outer surfaces of front legs and dorsum (Reid, 1997), a relatively well haired tail with a conspicuous terminal tuft, and by averaging smaller in most external and cranial measurements. Thus, VB017 (MHNG n°1811.098), VB021 (MHNG n°1811.100), and VB022 (MHNG n°1812.001) tally perfectly with the external and cranial measurements (Tables 4, 5) of *H.g.* in Schmidt *et al.* (1989), and Jones *et al.* (1974), but are below those given for *H.d.* in Rogers & Schmidt (1982), and Goodwin (1969).

All specimens of *H.g.* were caught on the ground, and ran away on the ground, sometimes directly into a near cavity, when released. Besides, no morphological adaptations towards arboreality were observed from sampled specimens, thus suggesting that *H.g.* is strongly terrestrial. Furthermore, the fact that *H.g.* was captured in all sites

except n°1 (Table 1), and in all forest habitats (Table 2), leads to infer that it is ubiquitous in the forests of Shipstern Nature Reserve, and probably absent from exposed areas covered by vegetation types 6 and 7.

Family MURIDAE

*Otonyctomys hatti* (Anthony, 1932)

Figs 6, 8

Yucatan Vesper Mouse

**DESCRIPTION.** The cranium is short and rather angular, with a convex dorsal profile (Fig. 6). The rostrum is short and narrow, not concealing the nasolacrimal capsules in dorsal view. The nasals are short, and project anteriorly beyond the premaxillae to conceal the nasal orifice from dorsal view. The zygomatic arches are slender, nearly parallel from the dorsal aspect, strongly convergent anteriorly, and forming downward a pronounced arc-shaped bend in lateral view. The interorbital region is narrow relative to braincase. Supraorbital shelves accentuate the dorsolateral margins of the interorbit and transform posteriorly into temporal ridges extending to conspicuous lambdoidal ridges. The supraorbital ridges are moderately grooved dorsally. Occipital ridges are present, and the supraoccipital crest is rounded but barely visible in dorsal view. The braincase is well inflated but not globose, with nearly vertical lateral and rear walls. The auditory bullae are greatly enlarged and rounded, and their anterior margin lies anteriorly to the basisphenoid/basioccipital suture. Both the basisphenoid and the basioccipital are narrow and elongate. The bony palate is moderately narrow, without fenestration, and does not extend beyond the molar rows posteriorly. The anterior margin of the maxillary/palatines suture is level with the margin between M1 and M2. The incisive foramina are rather long and conspicuous, and their posterior margin lies slightly posteriorly to the anterior margin of the orbits. The teeth number 16. The molar toothrows are straight along their labial margins, and parallel. Incisors are moderately large with smooth orangish enamel faces; in lateral profile, the uppers curve back toward the molar rows, an opisthodont configuration. The dental formula is: i 1/1, c 0/0, p 0/0, and m 3/3. The dentary has a short coronoid process, a very long and stout condyloid process, a well developed angular projection, and a rather deep but short ramus; the capsular process is barely visible.

Pes has moderately swivelling ankle joints, but no opposable hallux (Fig. 8). The plantar surface of pes is unpigmented on digits and otherwise purplish, devoid of distinctive scalation, naked from heel to tips of the digits, with little fringing hairs along its contour, and with four separate interdigital and two separate carpal pads. Dorsal and lateral surfaces of the metatarsal region and digits are pale brown and naked-looking, thinly covered with short white hairs. Claws are short and unpigmented, with a tuft of white hair at their base.

**DISCUSSION.** Just as *H. gaumeri*, *O. hatti* is endemic to the Yucatán Peninsula, and its southern range extends no further than N Belize and N Guatemala (Reid, 1997; Peterson, 1965). Consequently, although *O. h.* may be confused with *Nyctomys sumichrasti*, their respective ranges are not overlapping – *N.s.* is a typical Central American endemic (McCarthy *et al.*, 1998) seemingly absent from the Yucatán Peninsula, Mexico, apart from southern Belize (Jones *et al.*, 1974) – and they have never been reported as sympatric as yet.

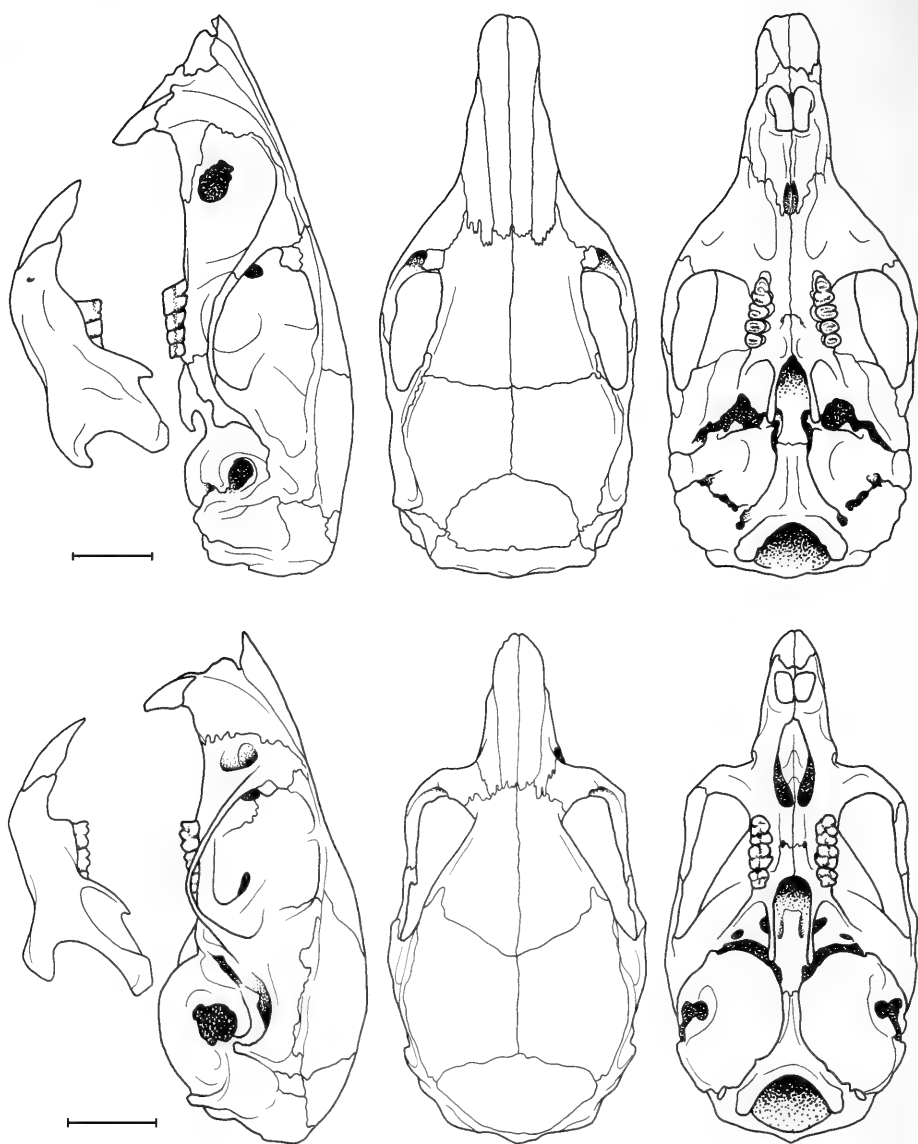


FIG. 6

**Top**, *Heteromys gaumeri* (VB017/MHNG n°1811.098); **bottom**, *Otonyctomys hatti* (VB182/MHNG n°1812.009). Dorsal, ventral, and lateral view of cranium and lateral view of left dentary. Scale bars: 5 mm.

The single specimen captured in this study (VB182, MHNG n°1812.009) is assigned to the age class II (Genoways & Jones, 1972), and is probably too young to be distinguished with certainty, on the basis of external characters. However, even

knowing that very few skull characters separate *O.h.* from *N.s.*, the skull of VB182 is easily characterized by its greatly enlarged auditory bullae, which are more than twice as large as those of *N.s.* (Peterson, 1965).

VB182 was found to have a remarkable agility to climb on all surfaces of its mesh wire trap. Also, the morphology of its hindfeet with moderately swivelling ankle joints leads to infer that it is scansorial. Besides, by referring to the habitat description in Reid (1997), *O.h.* is likely to be ubiquitous, although rare, in the forests of SNR.

*Ototylomys phyllotis* (Merriam, 1901)

Figs 7, 8

Big-eared Climbing Rat

**DESCRIPTION.** The cranium is elongate and rather angular, with a flattened dorsal profile, gently convex over braincase (Fig. 7). The rostrum is long and narrow, not concealing the nasolacrimal capsules in dorsal view. The nasals are rather long and terminate in a rounded angle anteriorly, projecting beyond the premaxillae to conceal the nasal orifice from dorsal view. The zygomatic arches are stout, fairly angular from the dorsal aspect, and strongly convergent anteriorly. The interorbital region is rather broad relative to braincase. Supraorbital shelves accentuate the dorsolateral margins of the interorbit and transform posteriorly into low temporal ridges extending to prominent lambdoidal ridges. The supraorbital ridges are moderately grooved dorsally. Occipital ridges are present, and the supraoccipital crest is clearly angular in dorsal view. The braincase is boxlike, with nearly vertical lateral and rear walls. The auditory bullae are large and rounded, and their anterior margin lies anteriorly to the basisphenoid/basioccipital suture. Both the basisphenoid and the basioccipital are moderately wide and elongate. The bony palate is moderately narrow, without fenestration, and does not extend beyond the molar rows posteriorly. The anterior margin of the maxillary/palatines suture is level with M2. The incisive foramina are long, broad, conspicuous, and their posterior margin lies slightly posteriorly to the anterior margin of M1. The teeth number 16. The molar toothrows are straight along their labial margins, and parallel. Incisors are moderately large with smooth orangish enamel faces; in lateral profile, the uppers curve back toward the molar rows, an opisthodont configuration. The dental formula is: i 1/1, c 0/0, p 0/0, and m 3/3. The dentary has a short coronoid process, a long and stout condyloid process, a broad and well developed angular process, and a moderately deep and short ramus; the capsular process is barely visible.

The plantar surface of pes is unpigmented on digits and pads, and otherwise purplish, devoid of distinctive scalation, naked from heel to tips of the digits, with little fringing hairs along its contour, and with four separate interdigital and two separate carpal pads (Fig. 8). Dorsal and lateral surfaces of the metatarsal region and digits are greyish white, and thinly covered with short white hairs. Claws are short and unpigmented, with a tuft of white hair at their base.

**DISCUSSION.** *O. phyllotis* is a typical Central American endemic (McCarthy *et al.*, 1998), ubiquitous in the Yucatán Peninsula.

Whereas few skull characters are distinctly separating *O.p.* from a species such as *Tylomys nudicaudus* – also a Central American endemic, seemingly absent from the states of Campeche, Yucatán, and Quintana Roo, Mexico (Reid, 1997; Jones *et al.*,

1974), but likely to be sympatric with *O.p.* throughout Belize – on the basis of external characters, it can hardly be confused with any other species. Indeed, *O.p.* is characterized by a conspicuous patch of white fur at the ear basis. Also, if both species have a shiny, naked-looking, and broadly scaled tail, its distal half is white or yellow pigmented in *T.n.* (Lawlor, 1982). Besides, *O.p.* averages smaller in most external and cranial measurements. In the case of VB001 (MHNG n°1811.089), VB002 (MHNG n°1811.090), VB004 (MHNG n°1811.091), VB005 (MHNG n°1811.092), VB063 (MHNG n°1811.094), VB105 (MHNG n°1811.096), VB121 (MHNG n°1811.097), and VB128 (MHNG n°1812.061), however, the latter are rather at the bottom, or even below (Tables 4, 5), the measurements given for *O.p.* in Lawlor (1982). Nevertheless, the same author (1969) reported that *O.p.* is characterized by considerable local and geographic variation in size and pelage coloration – it varies gradually from small and dusky brown in the lowlands of the Yucatán Peninsula, to large and dark greyish-brown in Costa Rica, and in the highlands of Chiapas and Guatemala.

Specimens of *O.p.* were caught at all levels from the ground to a height exceeding three meters. Also, when released, most of them ran away on the ground, sometimes directly into a near cavity, whereas a fraction of them climbed on the surrounding vegetation before returning to the ground. Such observations were also recorded by Lackey (1989), and suggest that *O.p.* is terrestrial – numerous dens were observed in the ground – but also very common in the vegetation composing the forest understory. Besides, the fact that *O.p.* was captured in all sites (Table 1), and in all forest habitats (Table 2), leads to infer that it is ubiquitous in the forests of SNR, and probably absent from exposed areas covered by vegetation type 7. Furthermore, regarding the percentage of total captures recorded for *O.p.* (Table 1), and the frequent observations of predators around the traps, the big-eared climbing rat is certainly important in the diets of many sympatric vertebrate carnivores in SNR.

### *Peromyscus yucatanicus* (Allen & Chapman, 1897)

Figs 7, 8

#### Yucatan Deer Mouse

**DESCRIPTION.** The cranium is elongate and rather slender, with a convex dorsal profile (Fig. 7). The rostrum is long and narrow, not concealing the nasolacrimal capsules in dorsal view. The nasals are long and terminate in a rounded angle anteriorly, projecting beyond the premaxillae to conceal the nasal orifice from dorsal view. The zygomatic arches are slender, parallel from the dorsal aspect, strongly convergent anteriorly, and forming downward a pronounced arc-shaped bend in lateral view. The interorbital region is narrow relative to braincase. Supraorbital shelves accentuate the dorsolateral margins of the interorbit and transform posteriorly into barely visible low temporal ridges extending to inconspicuous lambdoidal ridges. The supraorbital ridges are moderately grooved dorsally. Occipital ridges are absent, and the supraoccipital at its margin with the interparietal is smooth in dorsal view. The braincase is inflated but not globose, with nearly vertical lateral and rear walls. The auditory bullae are moderately large and not clearly rounded; their anterior margin lies anteriorly to the basisphenoid/basioccipital suture. Both the basisphenoid and the basioccipital are moderately wide and elongate. The bony palate is rather broad, without fenestration, and does not extend beyond the molar rows posteriorly. The anterior margin of the



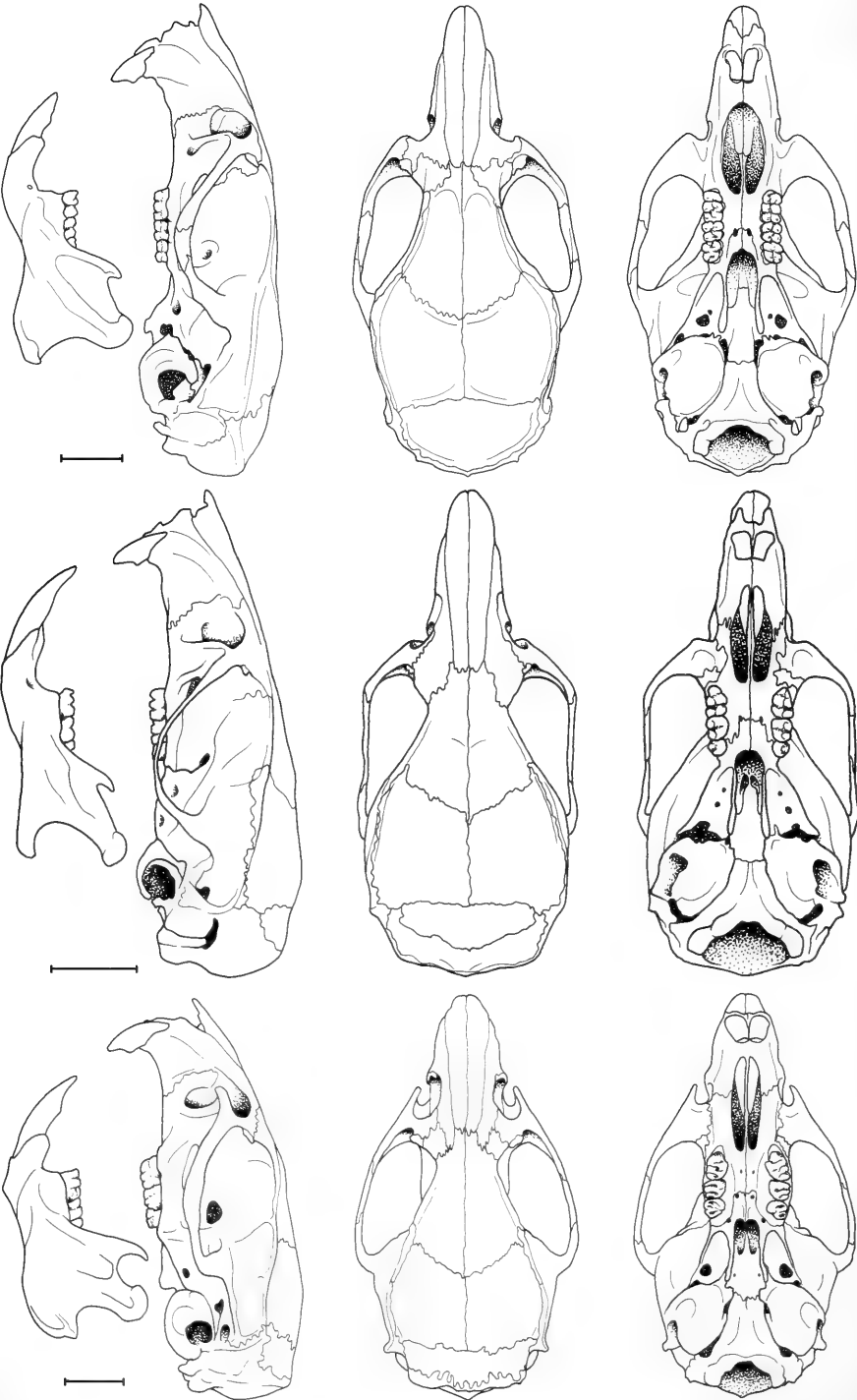
maxillary/palatines suture is level with the margin between M1 and M2. The incisive foramina are long and conspicuous, and their posterior margin is level with the anterior margin of the orbits. The teeth number 16. The molar toothrows are only slightly convex along their labial margins, and slightly convergent posteriorly. Incisors are moderately large with smooth orangish enamel faces; in lateral profile, the uppers curve back toward the molar rows, an opisthodont configuration. The dental formula is : i 1/1, c 0/0, p 0/0, and m 3/3. The dentary has a falciform coronoid process, a long and stout condyloid process, a well developed angular process, and a moderately deep and short ramus; the capsular process is barely visible.

The plantar surface of pes is greyish-brown, devoid of distinctive scalation, thinly covered with short black hairs on the heel, with little fringing hairs along its contour, and with four separate interdigital and two separate carpal pads (Fig. 8). Dorsal and lateral surfaces of the metatarsal region and digits are white, thinly covered with short white hairs. Claws are short and unpigmented, with a tuft of white hair at their base.

DISCUSSION. *Pyucatanicus* is easily confused with *P.mexicanus*. Nevertheless, *P.m.* is a typical Central American endemic seemingly absent from the Yucatán Peninsula, Mexico, apart from southern Belize (McCarthy *et al.*, 1998). Whereas *P.y.* is endemic to the Yucatán Peninsula, and its present southern range extends no further than in the southern part of the states of Campeche and Quintana Roo, Mexico (Reid, 1997). Consequently, their respective ranges are not overlapping, and *P.y.* is considered as allopatric from *P.m.* (Young & Jones, 1983). However, Huckaby (1980) reported that the southern limits of the range of *P.y.* are not clearly known, which is confirmed by the present study. Indeed, the presence of *P.y.* in Shipstern Nature Reserve constitutes a first mention for Belize (McCarthy *et al.*, 1998), and suggests that its range is extending more southerly to the limit agreed at present.

On the basis of external characters, *P.y.* and *P.m.* are hardly distinguishable; *P.y.* differs in being smaller, both externally and cranially (Young & Jones, 1983). In the case of VB225 (MHNG n°1812.010), the external and cranial measurements (Tables 4, 5) tally perfectly with those of *P.y.* in Lawlor (1965), Huckaby (1980), and Lackey (1976), but are below the ranges given for *P.m.* in Huckaby (1980), and Goodwin (1969). Nevertheless, it is best distinguished from *P.m.* by the accessory ridges of its upper and lower molars that are well-developed and fused with the labial styles (Lawlor, 1965; Hooper, 1957).

Although serious conclusions cannot be drawn from two isolate captures, the fact that VB089 and VB225 were captured on the ground and at a height of 2 ft respectively, and that no morphological adaptations towards arboreality were observed, suggest that it is mainly terrestrial, with a moderate ability to climb on the low vegetation composing the understory. Furthermore, the habitat description in Reid (1997) leads to infer that *P.y.* is probably ubiquitous in the forests of Shipstern Nature Reserve, although it was only recorded from the Shipstern area (Fig. 2).



*Sigmodon hispidus* (Say & Ord, 1825)

Figs 7, 8

## Hispid Cotton Rat

**DESCRIPTION.** The cranium is short and rather broad, with a moderately convex dorsal profile (Fig. 7). The rostrum is short and broad, but not concealing the deeply excavated nasolacrimal capsules in dorsal view. The nasals are short and terminate in a rounded angle anteriorly, projecting beyond the premaxillae to conceal the nasal orifice from dorsal view. The zygomatic arches are stout, convex from the dorsal aspect, and convergent anteriorly. The interorbital region is rather narrow relative to braincase. Supraorbital shelves accentuate the dorsolateral margins of the interorbit and transform posteriorly into low temporal ridges extending to conspicuous lambdoidal ridges. The supraorbital ridges are grooved dorsally. Occipital ridges are present, and in average 3.1 mm distant from temporal ridges. The supraoccipital crest is angular in dorsal view, but also when viewed posteriorly. The braincase is only slightly inflated, with nearly vertical lateral and rear walls. The auditory bullae are moderately large and rounded; their anterior margin lies anteriorly to the basisphenoid/basioccipital suture. The basisphenoid is short, contrasting with a wide and rather elongate basioccipital. The diameter of the foramen ovale is less than three-quarters the diameter of M3. The bony palate is fairly broad, without fenestration, and with a well-developed median crest extending beyond the molar rows posteriorly (spinous process). The anterior margin of the maxillary/palatines suture is level with M2. The spinous anterodorsal process of the zygomatic plate is blunt, but clearly visible. The incisive foramina are long, narrow, conspicuous, and their posterior margin lies slightly posteriorly to the anterior margin of the orbits. The teeth number 16. The molar toothrows are convex along their labial margins, and slightly convergent anteriorly. Incisors are large with ungrooved orangish enamel faces; in lateral profile, the uppers curve back toward the molar rows, an opisthodont configuration. The dental formula is:  $i\ 1/1$ ,  $c\ 0/0$ ,  $p\ 0/0$ , and  $m\ 3/3$ . The dentary has a falciform coronoid process, a long and stout condyloid process, a broad and well developed angular process, and a deep and short ramus; the capsular process is clearly visible.

The plantar surface of pes is dark grey, with a distinctive scalation, naked from heel to tips of the digits, with conspicuous fringing hairs along its contour, and with four separate interdigital and two separate carpal pads (Fig. 8). Dorsal and lateral surfaces of the metatarsal region and digits are grey, and thinly covered with short orangish or silvery hairs. The three middle digits are much longer than the outer two, and have enlarged claws. Claws are otherwise greyish, with a conspicuous tuft of silvery hair at their base.

**DISCUSSION.** The relationships among the seven valid species of the genus *Sigmodon* that are currently recognized in North and Central America have long been the subject of controversy, and the genetic integrity of *S. hispidus* cannot be assumed as yet (Elder & Lee, 1985; Voss, 1992; Peppers & Bradley, 2000). Indeed, *hispidus* as

FIG. 7

**Top.** *Otodylomys phyllotis* (VB002/MHNG n°1811.090); **middle,** *Peromyscus yucatanicus* (VB225/MHNG n°1812.010); **bottom,** *Sigmodon hispidus* (VB147/MHNG n°1812.004). Dorsal, ventral, and lateral view of cranium and lateral view of left dentary. Scale bars: 5 mm.

currently recognized may prove to consist of several morphologically cryptic but genetically distinct geographical units, and particularly in Central American populations that have virtually received no revisionary attention (Voss, 1992).

Traditionally, the genus *Sigmodon* is divided into two controversial (Elder & Lee, 1985) taxonomic groups: the *S.hispidus* and the *S.fulviventer* groups. Apart from the members of the *S.fulviventer* group from which it differs by having a sparsely haired tail, with large scales (0.75 mm wide rather than 0.5 mm), *S.hispidus* could be confused with the two other species of the *S.hispidus* group: *S.arizonae* and *S.mascotensis*. But, whereas *S.h.* is ubiquitous in Central America – its range extends from Northern Venezuela to Central and South-East United States, but it is absent from the west coast of Mexico – *S.a.* and *S.m.* are confined to the northern and southern part respectively of the Mexican west coast (Zimmerman, 1970). As a result, the three species are not expected to be sympatric in Belize.

*S.h.*, *S.a.*, and *S.m.* are remarkably uniform in external appearance, with virtually no interspecific variation. *S.h.* is, nevertheless, distinguishable by having a generally shorter hind foot – less than 34 mm, usually averaging 32 mm (Cameron & Spencer, 1981; Zimmerman, 1970). With a mean of 26.5 mm, the adult (Voss, 1992) specimens examined during the present study are therefore clearly below the average. Similarly, the external and cranial measurements of VB146 (MHNG n°1812.003), VB147 (MHNG n°1812.004), and VB148 (MHNG n°1812.005) are rather at the bottom (Tables 4, 5), or below, those given for *S.h.* in Cameron & Spencer (1981), Voss (1992), and Goodwin (1969). However, they better correspond to the measurements given in Jones *et al.* (1974) for specimens that were caught to the west of Chetumal, Quintana Roo, Mexico. The latter observations lead to formulate the hypothesis of a morphologically smaller *S.h.* population in the south of Quintana Roo and northern Belize, and further underlines the need for a complete revision of the genus in the Yucatán Peninsula.

Several skull characters allowed VB146, VB147, and VB148, to be identified. Indeed, the combination of a distance between the temporal and occipital ridges inferior to 3.6 mm, a foramen ovale with a diameter inferior to 3/4 the diameter of M3, and a well developed crest on the posterior part of the bony palate distinguish them clearly from *S.a.* and *S.m.* (Zimmerman, 1970). Also, they differ from *S.a.* by having a narrower ventral surface of the presphenoid, a blunt and rather broad spinous anterodorsal process of the zygomatic plate, and an angular supraoccipital crest in posterior view (Severinghaus & Hoffmeister, 1978).

*S.h.* is a habitat specialist, generally found wherever grass is a significant component of the local vegetation (Voss, 1992). This is confirmed by the fact that specimens of the present study were only captured in vegetation types 6 and 7 of the site n°6 (Tables 1, 2); *S.h.* is therefore expected to be ubiquitous in such habitats, but absent from the forests of SNR. Furthermore, all specimens of *S.h.* were caught on the ground, and ran away on the ground when released. Besides, no morphological adaptations towards arboreality were observed from sampled specimens, thus confirming that *S.h.* is strongly terrestrial.

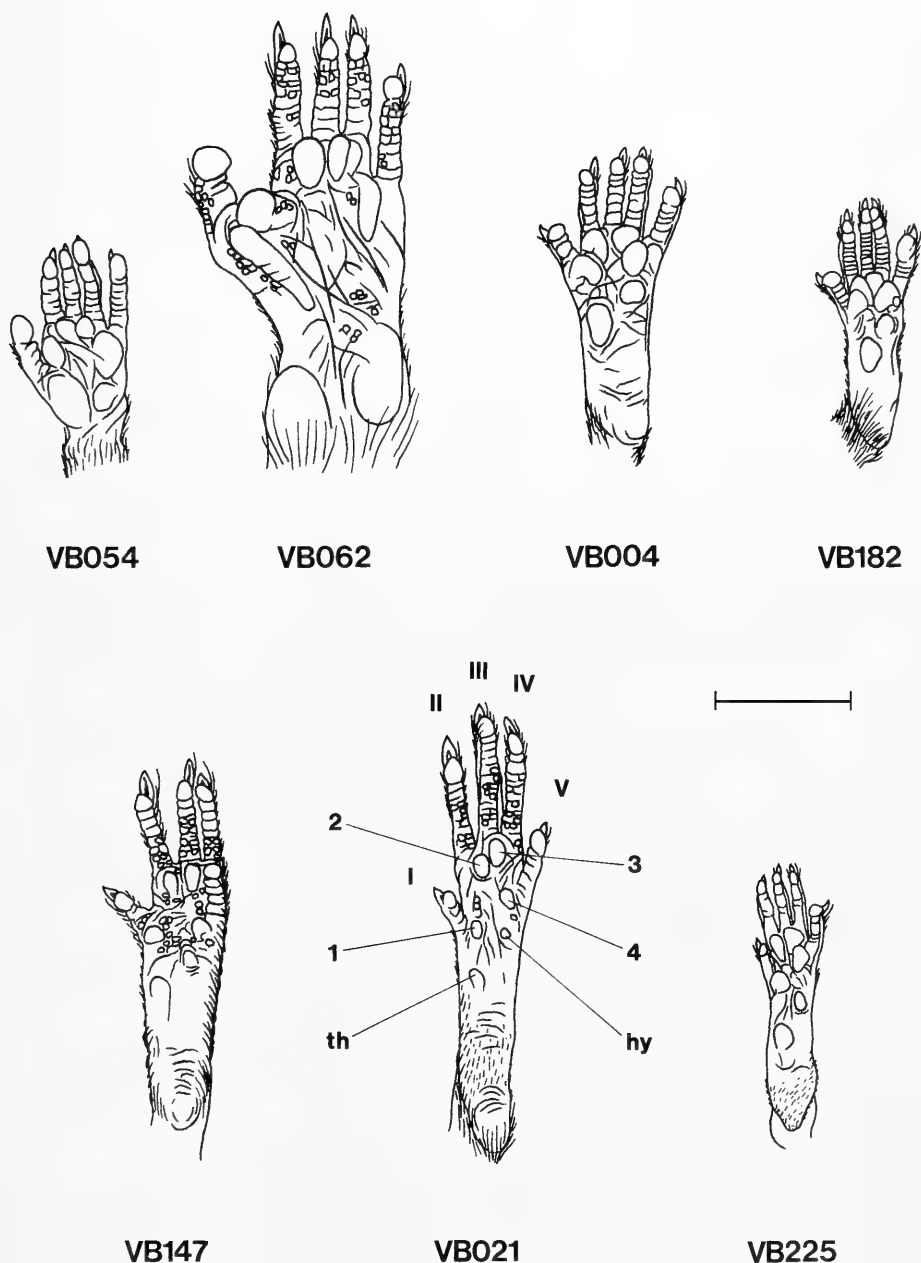


FIG. 8

*Marmosa mexicana* (VB054), *Didelphis virginiana* (VB062), *Heteromys gaumeri* (VB021), *Otonyctomys hatti* (VB182), *Ototylomys phyllotis* (VB004), *Peromyscus yucatanicus* (VB225), and *Sigmodon hispidus* (VB147). Plantar view of left pes. **hy**, hypothenar pad; **th**, thenar pad; **1-4**, carpal pads; **I-V**, digits. Scale bar: 10 mm.

## GENERAL DISCUSSION

Ideally, fieldwork should be continued until asymptotic species lists are obtained. This is nearly achieved in the case of several Central American field stations with long histories of inventory work, where high diversity – quantified as species richness (number of species) – was obtained (Voss & Emmons, 1996); but even in these regions, new species were recently added to the overall list. In the vicinity of the La Selva Biological Station, nearby the Braulio Carrillo National Park, Costa Rica, up to 114 mammalian species including 5 species of marsupials and 13 species of small rodents were recorded since the first inventory published by Slud in 1960 (Timm *et al.*, 1989). Further south in central Panama, up to 113 mammalian species including 6 species of marsupials and 10 species of small rodents were obtained from Barro Colorado Island, Gatun Lake, since Enders' surveys from 1929 to 1937 (Eisenberg & Thorington, 1973; Voss & Emmons, 1996). In the states of Veracruz and Oaxaca, Mexico, two species accounts based on long-term studies were reported by Hall & Dalquest (1963), and Goodwin (1969) respectively. In the first case, 156 mammalian species including 4 species of marsupials, 48 species of small rodents, and 7 species of shrews were recorded since Dalquest's first account in 1947. And in the state of Oaxaca, 204 mammalian species including 6 species of marsupials, 54 species of small rodents, and 10 species of shrews were listed since McDougall's surveys from 1943 to 1967.

By comparing the present study with the latter inventories, the list of small mammals obtained in Shipstern Nature Reserve appears very incomplete with only 2 species of marsupials, and 5 species of myomorph rodents. However, an expedition of six months is considered as very brief, and in such a case adding missing species to the inventory is just a matter of time. An essential problem with inventory comparisons is highlighted by the latter remark. Indeed, all inventory methods are biased because each is suitable for collecting or observing only a fraction of the morphologically and behaviorally diverse mammalian fauna that inhabits Neotropical forests, and special methods are required to add elusive species to faunal lists (Voss & Emmons, 1996). Hence, many methods must be used in combination to census whole communities, and virtually all existing inventories are incomplete. Furthermore, the degree of incompleteness is inversely correlated with inventory duration, so that species lists always increase with additional sampling effort up to an asymptote.

Consequently, results obtained in the present study are better compared to other short term inventories. In Belize, Rabinowitz & Nottingham (1989) sampled small mammals in the Cockscomb Basin of the Maya Mountains for several months in 1983 and 1984. Inventory sites such as the latter comprising both riparian and terra firme habitats are likely to have more diverse mammalian communities than more arid sites such as the one in SNR. This was confirmed by their results, with 4 species of marsupials, including *M.mexicana*, and 9 species of myomorph rodents, including *O.phyllotis* and *S.hispidus*. Besides, they recorded that three species – *Heteromys desmarestianus*, *Tylomys nudicaudus*, and *O.phyllotis* – accounted for 67.5% of the total capture. With *O.phyllotis* accounting for 90.8% and *H.gaumeri* 5.55% of the total capture (Table 1), results are even more striking in SNR, and confirm the general trend

highlighted by Fleming (1975) that neotropical mammal communities generally contain one or two relatively common species and many uncommon species of small mammals. Similarly, Disney (1968) reported from his study in central Belize that *O.phyllotis* and *H.gaumeri* were together the most common species with 76.7% of the total capture. Perhaps, these two species are the most aggressive of the community in northern Belize, and preclude the capture of trap-shy species.

Recently, another study was completed in the Chiquibul Forest Reserve of the Maya mountains (Caro *et al.*, 2001). Their capture results were fairly similar to those of Rabinowitz & Nottingham (1989), with 4 species of marsupials including *M.mexicana* and *D.virginiana*, and 7 species of myomorph rodents, including *H.gaumeri* and *O.phyllotis*. By combining these latter results with those obtained in SNR, it appears that at least 4 small mammal species – *M.mexicana*, *D.virginiana*, *H.gaumeri* and *O.phyllotis* – are sympatric throughout Belize. In addition, two species of squirrels – *Sciurus yucatanensis* and *S.deppeii* – were recorded from the Cockscomb Basin, Chiquibul Forest Reserve, and SNR by sight (Appendix III), and can also be considered as sympatric. However, a main difference in SNR is the presence of species such as *O.hatti* and *P.yucatanicus* that are endemic to the Yucatán Peninsula (McCarthy *et al.*, 1998). In this way, with additional endemics such as *H.gaumeri* and *S.yucatanensis*, the small mammal fauna in SNR appears to be closely related to the rodent fauna listed by Jones *et al.* (1974) in Yucatán.

The overall trapping success (3.5%) realized in this study falls within the range of observed success rates in other neotropical small mammal inventories. In the state of Minas Gerais, Brazil, Da Fonseca & Kierulff (1989) recorded a trapping success of 2.4%, and Stallings (1989) 7.5%. In the Maya Mountains, Belize, Rabinowitz & Nottingham (1989) recorded a trapping success of 5.23%, and Caro *et al.* (2001) 0.8%. However, the site-to-site trapping success realized in Shipstern Nature Reserve (Table 3) is fluctuating markedly, ranging from 1.2% in site n°2 to 8.8% in site n°4. Such a fluctuation was also reported by Stallings (1989) where the trapping success ranged from 2.3% to 18.8% from one site to another. In the case of SNR, these irregular trapping results are unlikely to be due to a temporal fluctuation in density, since both sites n°2 and 4 were surveyed during the driest months. Furthermore, the highest results (8.8% and 6.6%) were both recorded from sites n°4 and 8, that is in the Shipstern area (Fig. 2). The latter observation leads to consider a possible higher density in forests situated south to Shipstern Lagoon, at least for *O.phyllotis*. Indeed, such results are biased by the very high predominance of *O.phyllotis* in sites n°4 and 8 – with a total capture of 96.5% and a recapture rate of 2.3, and 95.2% and 1.8, respectively (Table 1) – and therefore cannot be extrapolated to other species such as *H.gaumeri* which remained fairly elusive with a recapture rate of 1.0.

The results of this small mammal inventory give substance to the impression of a diverse rodent community that is clearly affiliated to the partly endemic fauna of the Yucatán Peninsula, Mexico. Besides, they demonstrate the important role that *O.phyllotis* plays in the community structure of small mammals in SNR. That a single species of rodent represents such a high percentage of the total capture, was not recorded in any of the studies cited in the text. Thus, the trapping methods used during this inventory may prove to be particularly effective in trapping *O.phyllotis*, but this factor alone

is surely not preponderant. Consequently, further study focused on the ecological requirements of this species will be of great interest with a view to characterizing the overall ecosystem prevailing in SNR. On the other hand, much research at the community level will be needed to ascertain the role of *O. phyllotis*, and other small mammals, in their maintenance of predators at higher trophic levels. Finally, by referring to the very short period in which the collecting took place, and the small mammal species list predicted from range overlap in appendix II, the sympatric diversity concretely obtained in SNR is certainly underestimated. In this way, further sampling will be needed to assess the presence of other small mammal species in the reserve, and the present inventory is therefore regarded as a preliminary assessment.

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## APPENDIX I: Tables 1-6

TABLE 1. Capture results. Field numbers in brackets correspond to the specimens captured at each site. See text for discussion.

## Site n°1 (VB001-VB016) 18°18'493"N / 88°11'182"W

| Species                     | Total captures | % Total | First captures | % Total | Recapture index |
|-----------------------------|----------------|---------|----------------|---------|-----------------|
| <i>Ototylomys phyllotis</i> | 27             | 100.0   | 16             | 100.0   | 1.7             |
| Total :                     | 27             | 100.0   | 16             | 100.0   | -               |

## Site n°2 (VB017-VB031) 18°18'119"N / 88°12'679"W

| Species                     | Total captures | % Total | First captures | % Total | Recapture index |
|-----------------------------|----------------|---------|----------------|---------|-----------------|
| <i>Heteromys gaumeri</i>    | 6              | 31.6    | 4              | 26.7    | 1.5             |
| <i>Ototylomys phyllotis</i> | 13             | 68.4    | 11             | 73.3    | 1.2             |
| Total :                     | 19             | 100.0   | 15             | 100.0   | -               |

## Site n°3 (VB032-VB058) 18°15'004"N / 88°15'002"W

| Species                     | Total captures | % Total | First captures | % Total | Recapture index |
|-----------------------------|----------------|---------|----------------|---------|-----------------|
| <i>Marmosa mexicana</i>     | 1              | 2.1     | 1              | 3.7     | 1.0             |
| <i>Heteromys gaumeri</i>    | 2              | 4.2     | 1              | 3.7     | 2.0             |
| <i>Ototylomys phyllotis</i> | 44             | 93.7    | 25             | 92.6    | 1.8             |
| Total :                     | 47             | 100.0   | 27             | 100.0   | -               |

## Site n°4 (VB059-VB123) 18°11'890"N / 88°11'209"W

| Species                       | Total captures | % Total | First captures | % Total | Recapture index |
|-------------------------------|----------------|---------|----------------|---------|-----------------|
| <i>Didelphis virginiana</i>   | 1              | 0.7     | 1              | 1.5     | 1.0             |
| <i>Heteromys gaumeri</i>      | 3              | 2.1     | 3              | 4.6     | 1.0             |
| <i>Ototylomys phyllotis</i>   | 136            | 96.5    | 60             | 92.4    | 2.3             |
| <i>Peromyscus yucatanicus</i> | 1              | 0.7     | 1              | 1.5     | 1.0             |
| Total :                       | 141            | 100.0   | 65             | 100.0   | -               |

## Site n°5 (VB124-VB144) 18°17'567"N / 88°12'912"W

| Species                     | Total captures | % Total | First captures | % Total | Recapture index |
|-----------------------------|----------------|---------|----------------|---------|-----------------|
| <i>Heteromys gaumeri</i>    | 7              | 19.4    | 6              | 28.6    | 1.2             |
| <i>Ototylomys phyllotis</i> | 29             | 80.6    | 15             | 71.4    | 1.9             |
| Total :                     | 36             | 100.0   | 21             | 100.0   | -               |

## Site n°6 (VB145-VB172) 18°18'159"N / 88°12'046"W

| Species                     | Total captures | % Total | First captures | % Total | Recapture index |
|-----------------------------|----------------|---------|----------------|---------|-----------------|
| <i>Heteromys gaumeri</i>    | 3              | 6.1     | 3              | 10.7    | 1.0             |
| <i>Ototylomys phyllotis</i> | 36             | 73.5    | 18             | 64.3    | 2.0             |
| <i>Sigmodon hispidus</i>    | 10             | 20.4    | 7              | 25.0    | 1.4             |
| Total :                     | 49             | 100.0   | 28             | 100.0   | -               |

## Site n°7 (VB173-VB207) 18°15'760"N / 88°15'998"W

| Species                     | Total captures | % Total | First captures | % Total | Recapture index |
|-----------------------------|----------------|---------|----------------|---------|-----------------|
| <i>Heteromys gaumeri</i>    | 1              | 1.9     | 1              | 2.9     | 1.0             |
| <i>Otonyctomys hatti</i>    | 1              | 1.9     | 1              | 2.9     | 1.0             |
| <i>Ototylomys phyllotis</i> | 51             | 96.2    | 33             | 94.2    | 1.5             |
| Total :                     | 53             | 100.0   | 35             | 100.0   | -               |

## Site n°8 (VB208-VB231) 18°13'638"N / 88°10'879"W

| Species                       | Total captures | % Total | First captures | % Total | Recapture index |
|-------------------------------|----------------|---------|----------------|---------|-----------------|
| <i>Heteromys gaumeri</i>      | 1              | 2.4     | 1              | 4.2     | 1.0             |
| <i>Ototylomys phyllotis</i>   | 40             | 95.2    | 22             | 91.6    | 1.8             |
| <i>Peromyscus yucatanicus</i> | 1              | 2.4     | 1              | 4.2     | 1.0             |
| Total :                       | 42             | 100.0   | 24             | 100.0   | -               |

## Sites n°1-8

| Species                       | Total captures | % Total | First captures | % Total | Recapture index |
|-------------------------------|----------------|---------|----------------|---------|-----------------|
| <i>Marmosa mexicana</i>       | 1              | 0.25    | 1              | 0.45    | 1.0             |
| <i>Didelphis virginiana</i>   | 1              | 0.25    | 1              | 0.45    | 1.0             |
| <i>Heteromys gaumeri</i>      | 23             | 5.55    | 19             | 8.15    | 1.2             |
| <i>Otonyctomys hatti</i>      | 1              | 0.25    | 1              | 0.45    | 1.0             |
| <i>Ototylomys phyllotis</i>   | 376            | 90.8    | 200            | 86.6    | 1.8             |
| <i>Peromyscus yucatanicus</i> | 2              | 0.5     | 2              | 0.9     | 1.0             |
| <i>Sigmodon hispidus</i>      | 10             | 2.4     | 7              | 3.0     | 1.4             |
| Total :                       | 414            | 100.0   | 231            | 100.0   | -               |

TABLE 2. Capture results per vegetation type. Vegetation types, see table 6.

| Sites n°1-8                   |                |                  |    |    |   |    |    |    |    |   |    |   |    |
|-------------------------------|----------------|------------------|----|----|---|----|----|----|----|---|----|---|----|
| Species                       | Total captures | Vegetation types |    |    |   |    |    |    |    |   |    |   |    |
|                               |                | 1                | 2  | 3  | 4 |    |    |    | 5  | 6 | 7  | 8 |    |
|                               |                |                  |    | P  | L | Pu | Ti | Mu | Ta |   |    |   |    |
| <i>Marmosa mexicana</i>       | 1              | 1                | -  | -  | - | -  | -  | -  | -  | - | -  | - | -  |
| <i>Didelphis virginiana</i>   | 1              | -                | -  | -  | - | -  | -  | -  | 1  | - | -  | - | -  |
| <i>Heteromys gaumeri</i>      | 23             | 6                | 7  | 3  | - | -  | -  | -  | 6  | - | -  | - | 1  |
| <i>Otonyctomys hatti</i>      | 1              | 1                | -  | -  | - | -  | -  | -  | -  | - | -  | - | -  |
| <i>Ototylomys phyllotis</i>   | 376            | 233              | 24 | 27 | 7 | -  | -  | 33 | 12 | 6 | 3  | - | 31 |
| <i>Peromyscus yucatanicus</i> | 2              | 1                | -  | -  | - | -  | -  | -  | -  | - | -  | - | 1  |
| <i>Sigmodon hispidus</i>      | 10             | -                | -  | -  | - | -  | -  | -  | -  | - | 9  | 1 | -  |
| Total :                       | 414            | 242              | 31 | 30 | 7 | -  | -  | 33 | 19 | 6 | 12 | 1 | 33 |

TABLE 3. Trapping success. See text for discussion.

| Site n° | Trapping periods | No. trap nights | No. captures | % success |
|---------|------------------|-----------------|--------------|-----------|
| 1       | May 1-11         | 1600            | 27           | 1.7       |
| 2       | May 19-29        | 1600            | 19           | 1.2       |
| 3       | June 6-16        | 1600            | 47           | 2.9       |
| 4       | June 21- July 1  | 1600            | 141          | 8.8       |
| 5       | July 11-21       | 1600            | 36           | 2.3       |
| 6       | Aug 28-Sept 7    | 1600            | 49           | 3.1       |
| 7       | Sept 11-21       | 1600            | 53           | 3.3       |
| 8       | Sept 26-30       | 640             | 42           | 6.6       |
| Total : |                  | 11840           | 414          | 3.5       |

TABLE 4. External measurements. Body (mm) and mass (g) measurements are presented for adults of both sexes. n, sample size. Other abbreviations, mean and standard error, are defined in text.

| Variable | Mean (n=1)        |                     |                 |                       |
|----------|-------------------|---------------------|-----------------|-----------------------|
|          | <i>M.mexicana</i> | <i>D.virginiana</i> | <i>O. hatti</i> | <i>P. yucatanicus</i> |
| TL       | 323               | 389                 | 199             | 191                   |
| TV       | 174               | 186                 | 108             | 92                    |
| HF       | 20                | 33                  | 19              | 22                    |
| E        | 22                | 35                  | 13              | 19                    |
| NEB      | 35                | 58                  | 26              | 28                    |
| NEC      | 16                | 26                  | 13              | 15                    |
| SR       | 35                | -                   | 22              | 26                    |
| Weight   | 66                | 170                 | 24              | 24                    |

| <i>Heteromys gaumeri</i> |              |         |   | <i>Ototylomys phyllotis</i> |         |     |
|--------------------------|--------------|---------|---|-----------------------------|---------|-----|
| Variable                 | Mean ± SE    | Range   | n | Mean ± SE                   | Range   | n   |
| TL                       | 266.6 ± 5.58 | 252-286 | 5 | 263.87 ± 1.64               | 227-295 | 91  |
| TV                       | 138.4 ± 3.98 | 128-147 | 5 | 123.76 ± 1.09               | 97-150  | 94  |
| HF                       | 31.13 ± 0.9  | 25-33   | 8 | 23.55 ± 0.1                 | 21-29   | 95  |
| E                        | 16.88 ± 0.3  | 16-18   | 8 | 22.2 ± 0.12                 | 19-26   | 92  |
| NEB                      | 33.13 ± 0.3  | 32-34   | 8 | 35.9 ± 0.19                 | 29-41   | 93  |
| NEC                      | 18.88 ± 0.77 | 17-24   | 8 | 17.05 ± 0.14                | 11-20   | 93  |
| SR                       | 9.4 ± 0.24   | 9-10    | 5 | 7.83 ± 0.09                 | 6-10    | 94  |
| Weight                   | 60.22 ± 3.54 | 50-75   | 9 | 65.46 ± 1.15                | 43-96   | 102 |
| <i>Sigmodon hispidus</i> |              |         |   |                             |         |     |
| Variable                 | Mean ± SE    | Range   | n |                             |         |     |
| TL                       | 236.2 ± 6.3  | 220-253 | 5 |                             |         |     |
| TV                       | 97.2 ± 1.93  | 94-104  | 5 |                             |         |     |
| HF                       | 26.5 ± 0.62  | 24-28   | 6 |                             |         |     |
| E                        | 17.8 ± 0.58  | 16-19   | 5 |                             |         |     |
| NEB                      | 34.0 ± 1.03  | 31-37   | 6 |                             |         |     |
| NEC                      | 16.17 ± 0.7  | 14-18   | 6 |                             |         |     |
| SR                       | 15.0 ± 0.0   | 15-15   | 5 |                             |         |     |
| Weight                   | 84.67 ± 3.68 | 70-92   | 6 |                             |         |     |

TABLE 5. Cranial measurements (mm), presented for adults of both sexes. n, sample size. Other abbreviations, mean and standard error, are defined in text.

| Mean (n=1)               |                   |                     | Mean (n=1) |                   |                       |
|--------------------------|-------------------|---------------------|------------|-------------------|-----------------------|
| Variable                 | <i>M.mexicana</i> | <i>D.virginiana</i> | Variable   | <i>M.mexicana</i> | <i>D.virginiana</i>   |
| ONL                      | 35.41             | 56.99               | MB         | 12.68             | 18.77                 |
| CBL                      | 34.42             | 55.6                | OCB        | 7.11              | 12.42                 |
| NL                       | 15.27             | 26.24               | BB         | 12.65             | 19.21                 |
| BN                       | 4.71              | 8.85                | ZB         | 20.02             | 29.4                  |
| PL                       | 18.96             | 34.24               | IB         | 6.1               | 11.33                 |
| PW                       | 9.53              | 17.91               | IOC2       | 5.97              | 9.39                  |
| PPL                      | 13.41             | 16.77               | CD         | 11.43             | 16.66                 |
| RL                       | 12.05             | 23.19               | C-M4       | 13.38             | 20.03                 |
| RW                       | 5.59              | 11.57               | M1-M4      | 6.38              | 12.96                 |
| BRJ                      | 10.38             | 16.06               | CLMT       | 3.29              | 14.36                 |
| BRF                      | 6.65              | 9.91                | LM         | 24.8              | 42.31                 |
| BOL                      | 4.68              | 5.92                |            |                   |                       |
| <i>Heteromys gaumeri</i> |                   |                     |            |                   |                       |
|                          |                   |                     | Mean (n=1) |                   |                       |
| Variable                 | Mean ± SE         | Range               | n          | <i>O. hatti</i>   | <i>P. yucatanicus</i> |
| ONL                      | 35.46 ± 0.25      | 34.97-35.75         | 3          | 28.67             | 28.8                  |
| CBL                      | 33.27 ± 0.19      | 32.95-33.62         | 3          | 25.77             | 26.86                 |
| CIL                      | 29.49 ± 0.1       | 29.34-29.67         | 3          | 24.81             | 25.49                 |
| NL                       | 14.44 ± 0.34      | 13.85-15.01         | 3          | 9.21              | 11.09                 |

|        |              |             |   |       |       |
|--------|--------------|-------------|---|-------|-------|
| PL     | 20.28 ± 0.45 | 19.44-21.0  | 3 | 12.4  | 14.42 |
| PPL    | 10.51 ± 0.23 | 10.12-10.93 | 3 | 11.11 | 10.56 |
| LD     | 9.22 ± 0.36  | 8.51-9.63   | 3 | 6.75  | 7.98  |
| RL     | 15.56 ± 0.18 | 15.27-15.88 | 3 | 9.63  | 11.1  |
| BR     | 6.33 ± 0.23  | 6.07-6.79   | 3 | 4.79  | 5.05  |
| LIF    | 2.87 ± 0.24  | 2.62-3.34   | 3 | 4.75  | 5.86  |
| BIF    | 0.91 ± 0.04  | 0.84-0.96   | 3 | 2.38  | 2.49  |
| BZP    | 4.36 ± 0.06  | 4.29-4.49   | 3 | 1.46  | 2.04  |
| OL     | 8.81 ± 0.05  | 8.71-8.89   | 3 | 8.76  | 8.92  |
| LBP    | 8.0 ± 0.25   | 7.57-8.42   | 3 | 3.88  | 4.09  |
| BBP    | 5.34 ± 0.11  | 5.2-5.56    | 3 | 4.95  | 5.18  |
| MPFL   | 4.33 ± 0.17  | 4.06-4.64   | 3 | 5.03  | 4.88  |
| MPFW   | 2.12 ± 0.12  | 1.98-2.35   | 3 | 2.11  | 1.75  |
| BOL    | 4.95 ± 0.1   | 4.79-5.14   | 3 | 4.51  | 3.78  |
| BL     | 4.87 ± 0.07  | 4.75-5.0    | 3 | 7.84  | 4.19  |
| BW     | 3.54 ± 0.08  | 3.45-3.69   | 3 | 5.54  | 3.38  |
| MB     | 14.81 ± 0.27 | 14.43-15.32 | 3 | 12.79 | 11.55 |
| OCB    | 6.88 ± 0.22  | 6.45-7.21   | 3 | 6.15  | 6.53  |
| LB     | 13.52 ± 0.33 | 13.13-14.17 | 3 | 10.66 | 11.59 |
| BB     | 13.51 ± 0.17 | 13.3-13.85  | 3 | 13.1  | 11.87 |
| ZB     | 16.41 ± 0.15 | 16.19-16.7  | 3 | 14.29 | 13.04 |
| IB     | 8.82 ± 0.06  | 8.7-8.88    | 3 | 4.79  | 4.67  |
| CD     | 11.56 ± 0.15 | 11.32-11.84 | 3 | 11.58 | 9.55  |
| BM1    | 1.35 ± 0.05  | 1.3-1.45    | 3 | 1.28  | 1.28  |
| CLM1-3 | 4.6 ± 0.19   | 4.32-4.97   | 3 | 3.99  | 4.22  |
| DI     | 1.45 ± 0.05  | 1.37-1.55   | 3 | 1.33  | 1.37  |
| HI     | 5.29 ± 0.15  | 5.06-5.57   | 3 | 3.57  | 3.64  |
| CLMT   | 4.79 ± 0.06  | 4.66-4.87   | 3 | 4.16  | 4.29  |
| LM     | 15.01 ± 0.14 | 14.79-15.28 | 3 | 13.22 | 14.31 |

| Variable | <i>Ototylomys phyllotis</i> |             |   | <i>Sigmodon hispidus</i> |             |   |
|----------|-----------------------------|-------------|---|--------------------------|-------------|---|
|          | Mean ± SE                   | Range       | n | Mean ± SE                | Range       | n |
| ONL      | 36.81 ± 0.61                | 33.86-38.86 | 8 | 32.82 ± 0.78             | 31.59-34.26 | 3 |
| CBL      | 34.37 ± 0.67                | 30.94-36.84 | 8 | 30.94 ± 0.74             | 29.64-32.19 | 3 |
| CIL      | 32.08 ± 0.55                | 29.43-34.18 | 8 | 30.55 ± 0.68             | 29.3-31.65  | 3 |
| NL       | 12.48 ± 0.29                | 11.55-13.65 | 8 | 11.81 ± 0.37             | 11.07-12.25 | 3 |
| PL       | 18.15 ± 0.32                | 16.44-19.05 | 8 | 17.34 ± 0.43             | 16.56-18.05 | 3 |
| PPL      | 13.74 ± 0.36                | 12.27-15.42 | 8 | 11.39 ± 0.34             | 10.82-11.98 | 3 |
| LD       | 9.02 ± 0.14                 | 8.42-9.55   | 8 | 9.19 ± 0.36              | 8.49-9.64   | 3 |
| RL       | 12.96 ± 0.31                | 11.73-13.93 | 8 | 11.81 ± 0.46             | 10.9-12.32  | 3 |
| BR       | 5.87 ± 0.12                 | 5.36-6.26   | 8 | 6.53 ± 0.2               | 6.21-6.9    | 3 |
| LIF      | 7.15 ± 0.12                 | 6.4-7.55    | 8 | 7.75 ± 0.19              | 7.41-8.05   | 3 |
| BIF      | 3.28 ± 0.09                 | 2.97-3.68   | 8 | 2.44 ± 0.14              | 2.21-2.69   | 3 |
| BZP      | 2.93 ± 0.09                 | 2.69-3.46   | 8 | 3.03 ± 0.1               | 2.86-3.22   | 3 |
| OL       | 10.79 ± 0.11                | 10.33-11.13 | 8 | 10.44 ± 0.33             | 10.1-11.11  | 3 |
| LBP      | 4.62 ± 0.07                 | 4.29-4.82   | 8 | 5.87 ± 0.11              | 5.76-6.08   | 3 |
| BBP      | 6.2 ± 0.11                  | 5.84-6.67   | 8 | 6.67 ± 0.29              | 6.14-7.15   | 3 |
| MPFL     | 6.3 ± 0.2                   | 5.65-7.37   | 8 | 4.66 ± 0.26              | 4.4-5.18    | 3 |
| MPFW     | 2.47 ± 0.04                 | 2.29-2.58   | 8 | 2.07 ± 0.13              | 1.82-2.26   | 3 |
| BOL      | 5.16 ± 0.14                 | 4.6-5.89    | 8 | 5.06 ± 0.1               | 4.94-5.27   | 3 |
| BL       | 6.33 ± 0.09                 | 5.81-6.64   | 8 | 5.86 ± 0.07              | 5.73-5.95   | 3 |
| BW       | 4.47 ± 0.12                 | 4.04-4.98   | 8 | 4.16 ± 0.01              | 4.14-4.18   | 3 |
| MB       | 13.54 ± 0.14                | 12.82-14.05 | 8 | 12.61 ± 0.31             | 12.1-13.16  | 3 |
| OCB      | 7.51 ± 0.14                 | 6.83-7.93   | 8 | 6.7 ± 0.16               | 6.44-7.0    | 3 |



|        |              |             |   |              |             |   |
|--------|--------------|-------------|---|--------------|-------------|---|
| LB     | 11.93 ± 0.24 | 10.76-12.83 | 8 | 11.89 ± 0.44 | 11.25-12.73 | 3 |
| BB     | 14.33 ± 0.18 | 13.49-15.13 | 8 | 13.14 ± 0.2  | 12.86-13.53 | 3 |
| ZB     | 17.82 ± 0.28 | 16.7-18.78  | 8 | 18.11 ± 0.59 | 16.96-18.87 | 3 |
| IB     | 5.84 ± 0.16  | 5.13-6.67   | 8 | 4.88 ± 0.11  | 4.72-5.09   | 3 |
| CD     | 11.44 ± 0.07 | 11.22-11.85 | 8 | 12.16 ± 0.25 | 11.65-12.43 | 3 |
| BM1    | 1.67 ± 0.01  | 1.61-1.71   | 8 | 1.74 ± 0.04  | 1.68-1.81   | 3 |
| CLM1-3 | 6.0 ± 0.06   | 5.68-6.15   | 8 | 5.08 ± 0.07  | 4.99-5.23   | 3 |
| DI     | 1.65 ± 0.05  | 1.4-1.81    | 8 | 1.89 ± 0.02  | 1.86-1.92   | 3 |
| HI     | 3.79 ± 0.16  | 3.11-4.46   | 8 | 5.73 ± 0.14  | 5.48-5.95   | 3 |
| CLMT   | 5.96 ± 0.05  | 5.72-6.08   | 7 | 5.89 ± 0.17  | 5.64-6.21   | 3 |
| LM     | 17.77 ± 0.3  | 16.73-18.77 | 7 | 17.22 ± 0.65 | 16.03-18.26 | 3 |

TABLE 6. Vegetation types 1 to 8. The New Trail, Main Trail, Xo-Pol, and Shipstern areas correspond to trapping sites 1/6, 2/5, 3/7, and 4/8 respectively (Fig. 2).

| Vegetation type  | n° | Description  |
|--|----|--|
| Yucatecan medium-sized semi-evergreen forest               | 1  | This forest type (30-50 ft) covers most of the land situated to the west of the reserve, including the Xo-Pol area, as well as the land situated to the south of Shipstern Lagoon, including the Shipstern area. But, whereas it alternates with extensive Cohune forests in the latter, such is not the case in the Xo-Pol area where Cohune trees are virtually absent. Dominant species composing its canopy are: <i>Brosimum alicastrum</i> , <i>Hampea trilobata</i> , <i>Coccoloba reflexiflora</i> , <i>Bursera simaruba</i> , <i>Metopium brownei</i> , and <i>Manilkara zapota</i> (emergent tree). Dominant understory species are: <i>Pithecellobium stevensonii</i> , <i>Coccoloba schiedeana</i> , <i>Ouratea lucens</i> , <i>Randia aculeata</i> , and <i>Croton reflexifolius</i> . Beside <i>Brosimum alicastrum</i> , differential species for this vegetation type are: <i>Dendropanax arboreus</i> , <i>Nectandra salicifolia</i> , <i>Pouteria campechiana</i> , <i>Protium copal</i> , <i>Quararibea funebris</i> , <i>Sabal yapa</i> , <i>Swartzia cubensis</i> , <i>Tetrapteris schiedeana</i> , <i>Talisia olivaeformis</i> , and <i>Nectandra coriacea</i> . An additional differential species, <i>Cryosophila stauracantha</i> , is found in the Xo-Pol area. |
| Yucatecan medium-sized semi-deciduous forest               | 2  | This forest type (30-45 ft) covers part of the land situated north of the reserve, where it alternates with Low semi-deciduous <i>Pseudophoenix s.sargentii</i> forests. In the Main Trail area, it is transitioning to vegetation type 1. Dominant species composing its canopy and its understory are similar to the Yucatecan medium-sized semi-evergreen forests, therefore it is very difficult to differentiate between the two. Besides, no differential species for it have been clearly brought out yet. Hence, it is mainly characterized by the absence of species such as <i>Brosimum alicastrum</i> , or <i>Pseudophoenix s.sargentii</i> that are distinguishing vegetation types 1 and 3 respectively.  |
| Low semi-deciduous <i>Pseudophoenix s.sargentii</i> forest | 3  | This forest type (20-40 ft) covers part of the land situated north of the reserve, including the New Trail area, where it alternates with Yucatecan medium-sized semi-deciduous forests. Some patches of it – coinciding with previously disturbed areas, after the passage of hurricane Janet in 1955 – are dominated by <i>Lysiloma latisiliquum</i> , and can be considered as a structural variant called <i>Lysiloma</i> -dominated <i>Pseudophoenix s.sargentii</i> forest. In the latter, the canopy is almost exclusively composed of <i>L.latisiliquum</i> , which will be gradually replaced by the usual canopy species yet confined to the understory. Otherwise, dominant species composing its canopy and its understory are fairly the same as in vegetation types 1 and 2, with commonly   |

associated species such as *Agave augustifolia* and *Diphyssa carthagenensis*. Differential species from this forest type are: *Pseudophoenix s.sargentii*, *Ceiba aesculifolia*, *Coccothrinax argentata*, *Erythroxylum rotundifolium*, *Gymnopodium floribundum*, *Hintonia octomera*, *Lysiloma latisiliquum*, *Neomillspaughia emarginata*, *Plumeria obtusa*, *Eugenia buxifolia*, *Randia truncata*, and *Beaucarnea ameliae*.

Low  
periodically  
inundated forest

- 4 This heterogeneous type of low forest (10-20 ft) is represented by four closely related vegetation types called Pucteal, Tintal, Mucal and Tasistal. Often growing in a complicated mosaic, locally called "Bajo forest", these plant communities are patchily scattered all over the reserve, and only part of them have yet been localized. Whereas the elevation and duration of inundation are gradually decreasing from the Mucal to the Pucteal, the Tasistal forms an open habitat (Tasiste marsh) close to being permanently inundated. It is dominated and differentiated by the palm *Accoelorrhaphe wrightii*, which is typically found with *Erythroxylum areolatum*, *Eugenia acapulcensis*, and *Jacquinia aurantiaca*, along with occasional species such as *Crescentia cujete*, *Borreria verticillata*, *Eustoma exaltatum*, and *Cladium jamaicense*. The Mucal forms a shrub forest (Muc marsh) dominated by *Dalbergia glabra*, which is typically found with species such as *Cameraria latifolia* and *Malpighia lundellii*. The Tintal forms a semi-open habitat (Tinta marsh) dominated by *Haematoxylon campechianum* and *Byrsonima bucidaefolia*. The Pucteal forms a low forest dominated by *Bucida buceras*.

*Bravaisia*  
*tubiflora*-  
dominated  
transitional zone

- 5 This type of low forest (10-25 ft) is mainly found in the surroundings of Shipstern Lagoon, where true forest is transitioning to open wetlands – in most cases, *Cladium jamaicense*-dominated herbaceous wetlands. Such transitional zones are inundated at the peak of the rainy season, whereas their soils remain water-saturated for most of the year. However, it can also be present in forest areas bordering more permanent bodies of water. It is dominated and differentiated by *Bravaisia tubiflora*, which is typically found with *Croton reflexifolius*, *Sabal yapa*, *Metopium brownei*, *Eugenia rhombea*, and *Eugenia acapulcensis*, along with occasional species such as *Ouatea nitida*, *Cameraria latifolia*, and *Dalbergia glabra*.

*Cladium*  
*jamaicense*-  
dominated  
herbaceous  
wetlands

- 6 This type of wetland (3-5 ft) is found in the surroundings of Shipstern Lagoon, where it forms a transitional belt between true forest and mangal flats. Often preceded by a *Bravaisia tubiflora*-dominated transitional zone, the belt varies in width from nearly nothing to about 350 ft (100m). It is dominated and differentiated by *Cladium jamaicense*, which is normally found with species such as *Conocarpus erectus* and *Solanum blodgettii*. Assimilated to this vegetation type, an omnipresent variant dominated by *Distichlis spicata* forms another transitional belt between the *Cladium jamaicense*-dominated belt and the mangal flats.

Discontinuous  
dwarf mangal  
interrupted by  
bare salt flats

- 7 This type of mangal association (3-6 ft) covers most of the periodically inundated surface bordering Shipstern Lagoon, and extending to areas of transition with true forest. Also found along the coast, it represents the dominant vegetation type within the reserve. It is fairly intermittent, with large patches of ground being completely bare of vegetation, sometimes interrupted by so-called "forest islands" – punctual change in ecological conditions allowing various vegetation types to establish, including *Thrinax radiata*-dominated low forests (not considered as a distinct vegetation type). It is dominated by the red mangrove (*Rhizophora mangle*), which constitutes well-developed

communities along the lagoon, but is otherwise found in patches of its dwarf counterpart. Typical associated species are the white (*Laguncularia racemosa*) and the black (*Avicennia germinans*) mangroves, only found in dwarf form. Occasionally, species such as *Distichlis spicata*, *Fimbristylis spadicea*, *Batis maritima*, and *Salicornia perennis* are also found in this vegetation type.

- Cohune forest      8      With the exception of a few small patches localized in the Xo-Pol area, this forest type (50-70 ft) is exclusively found in the deep soils of the land situated south of the lagoon, including the Shipstern area. It alternates with Yucatecan medium-sized semi-evergreen forests, and patches of Low periodically inundated forests. The dominant and differential species composing the canopy is the cohune palm: *Orbignya cohune*. Associated canopy and understory species are otherwise similar to vegetation type 1.

## APPENDIX II: Sympatric diversity in SNR

This appendix presents a diversity estimate for the small mammal fauna of Shipstern Nature Reserve. The following list does not include the sampled and sighted species :

|                                 |                                 |
|---------------------------------|---------------------------------|
| Gray Four-eyed Opossum          | <i>Philander opossum</i>        |
| Central American Woolly Opossum | <i>Caluromys derbianus</i>      |
| Robinson's Mouse Opossum        | <i>Marmosa robinsoni</i>        |
| Hispid Pocket Gopher            | <i>Orthogeomys hispidus</i>     |
| Forest Spiny Pocket Mouse       | <i>Heteromys desmarestianus</i> |
| Coue's Rice Rat                 | <i>Oryzomys couesi</i>          |
| Rusty Rice Rat                  | <i>Oryzomys rostratus</i>       |
| Northern Pygmy Rice Rat         | <i>Oligoryzomys fulvescens</i>  |
| Northern Climbing Rat           | <i>Tylomys nudicaudus</i>       |
| Slender Harvest Mouse           | <i>Reithrodontomys gracilis</i> |
| Maya Small-eared Shrew          | <i>Cryptotis mayensis</i>       |

This small mammal species list was predicted from range overlap – geographic expectations (Voss & Emmons, 1996) – and is mainly based on distributional data obtained from Reid (1997), Emmons & Feer (1997), and McCarthy *et al.* (1998). The known ecological requirements for each species was also taken into account, so as to minimize inaccuracy in diversity estimate. Thus, the Water Opossum (*Chironectes minimus*) is probably not present in the Shipstern Nature Reserve – it is semi-aquatic, favoring fast-flowing, rock- or gravel-bottomed streams in hilly country (Reid, 1997) – although its range is seemingly overlapping the area. Inversely, *Marmosa robinsoni* is presently considered as absent from northern Belize, but as already discussed, a reappraisal of all specimens of the species in Central America is needed to determine its exact distribution, so that it may well be present throughout Central America. Being a habitat generalist, *M. robinsoni* would therefore be expected in SNR. In the case of the Maya Small-eared Shrew (*Cryptotis mayensis*), information on its known geographic and ecological distribution is complemented by the observation of a non-identified species of shrew in the vicinity of SNR (Walker, 2000; pers. obs.).

By combining the present list (11 species) with the 7 sampled species of marsupials and myomorph rodents, and 3 sighted species of marsupial and squirrels – *Didelphis marsupialis*, *Sciurus yucatanensis*, and *S. deppiei* – a total of 21 small mammal species is expected in SNR. This diversity estimate, however, is subject to several sources of uncertainty, and is to be considered as a first approximation.

## APPENDIX III : Observed mammals in SNR

This appendix presents an inventory of the mammalian species observed during the field-work in Shipstern Nature Reserve. The observations were primarily based on direct sightings

(D), but also on indirect indices – nests (N), sets of tracks (T), scats (Sc), and sounds (So). A total of 19 small, medium-sized, and large mammals was thus obtained from SNR and its direct surroundings. In the following list, the numbers are related to the areas – New Trail (1), Main Trail (2), Xo-Pol (3), and Shipstern (4) areas (Fig. 2) – from which the corresponding species were recorded :

|                         |                                 |         |       |
|-------------------------|---------------------------------|---------|-------|
| Common Opossum          | <i>Didelphis marsupialis</i>    | D/So    | 3     |
| Northern Tamandua       | <i>Tamandua mexicana</i>        | D/So    | 4     |
| Nine-banded Armadillo   | <i>Dasybus novemcinctus</i>     | D       | 2     |
| Yucatán Squirrel        | <i>Sciurus yucatanensis</i>     | D       | 3     |
| Deppe's Squirrel        | <i>Sciurus deppei</i>           | D       | 3     |
| Mexican Porcupine       | <i>Coendou mexicanus</i>        | D       | 1     |
| Central American Agouti | <i>Dasyprocta punctata</i>      | D       | 1,2,4 |
| Paca                    | <i>Agouti paca</i>              | D/So    | 1     |
| Gray Fox                | <i>Urocyon cinereoargenteus</i> | D/So    | 1,2,3 |
| White-nosed Coati       | <i>Nasua narica</i>             | D/N     | 1,3,4 |
| Kinkajou                | <i>Potos flavus</i>             | D       | 4     |
| Tayra                   | <i>Eira barbara</i>             | D       | 3     |
| Puma                    | <i>Puma concolor</i>            | T       | 3     |
| Jaguar                  | <i>Panthera onca</i>            | T/Sc/So | 2,3   |
| Ocelot                  | <i>Leopardus pardalis</i>       | T/So    | 4     |
| Collared Peccary        | <i>Tayassu tajacu</i>           | D/So    | 1     |
| Baird's Tapir           | <i>Tapirus bairdii</i>          | T       | 2,3   |
| Red Brocket             | <i>Mazama americana</i>         | D/T/So  | 3     |
| White-tailed Deer       | <i>Odocoileus virginianus</i>   | D/T/So  | 3     |

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